List of U.S. Army Research Institute Research and Technical Publications

October 1, 1994 to September 30, 1999
With Author and Subject Index

U.S. Army Research Institute for the Behavioral and Social Sciences
5001 Eisenhower Avenue, Alexandria, Virginia 22333-5600

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Foreword

The means of dissemination of the results of ARI's research and development/studies and analysis program vary widely depending on the type of work, the subject matter, and the sponsor/proponent. Typically, major findings with immediate policy and procedural implications are briefed to sponsors and proponents in order to enable timely implementation. This is followed up with complete documentation in the form of research and technical publications such as the ones listed here. In many cases, these documents represent the actual item handed off to the sponsor/proponent; this is particularly true of the Research Product category. In other cases, results are published in order to provide a complete record of the work done, and for future reference by researchers doing work in the same or similar areas.

This annotated list for FY95 through FY99 provides an idea of both the depth and scope of the ARI research effort, and is a valuable resource for anyone interested in military psychology from either a scientific or operational perspective.

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Introduction

The primary responsibility of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is to maximize soldier effectiveness. ARI accomplishes its mission through research and development in the acquisition, training, utilization, and retention of Army personnel. ARI research and products affect every Army mission with a human performance component.

As convenient references for qualified agencies and individuals and sponsors, ARI publishes lists of its technical and research publications. This issue of the publication list describes reports published during the period October 1, 1994, to September 30, 1999. It contains the abstract of each publication and the bibliographic information needed to identify a publication. The abstracts have been written, as far as possible, to describe the principal research findings in non-technical terms; however, technical language is used to communicate efficiently the details of research analysis. Author and subject indexing provide access to individual reports and topics.

ARI Publications

ARI publications are divided into separate, consecutively numbered categories appropriate to their intended audience and function. During fiscal years 1995-1999, the following types of research and technical reports were issued by ARI:

Research Note (RN). An interim or final report typically of limited interest outside of ARI. It is filed with the Defense Technical Information Center (DTIC) but is not printed. Research Notes usually fall into one of the following categories:

- An in-house report that is of limited interest outside of ARI but is considered worth submitting to DTIC to be part of the Department of Defense (DoD) archive of technical documentation.
- An interim contract report that is of limited interest outside of ARI but is considered worth submitting to DTIC to be part of the DoD archive of technical documentation.
- A final contract report that is of limited interest outside of ARI but must be submitted to DTIC in accordance with Department of the Army regulations to close a contract.
- Material related to a Research Report or

Technical Report (detailed tables, graphs, charts, sample forms, and sample training and testing materials) published as a Research Note to economize on printing and distribution.

Research Product (RP). A user-oriented report intended to aid Army personnel. Examples are handbooks, manuals, and guidebooks.

Research Report (RR). A report of completed research intended primarily for dissemination to military managers. Research Reports may deal with policy-related issues but typically do not include specific policy recommendations.

Special Report (S). A published report on a topic of special interest or in-house research intended primarily for dissemination to a select audience.

Study Report (SR). A published report briefly documenting studies and analyses.

Study Note (SN). A Study Note may contain or consist of technical text, computer code, diskettes or tapes with software, databases, codebooks or other documentation, raw data, data collection instruments, figures, tables, or any other products that do not concisely convey the import of a project but which must be archived for technical completeness.

Technical Report (TR). A report of completed research intended primarily for dissemination to researchers.

Research Reports and Technical Reports published by the U.S. Army Research Institute for the Behavioral and Social Sciences are intended for sponsors of research and development (R&D) tasks and for other research and military agencies. Any findings ready for implementation at the time of publication are presented in the last part of the Executive Summary. Upon completion of a major phase of the task, formal recommendations for official action normally are conveyed to appropriate military agencies by briefing or memorandum.

ARI Distribution

Initial distribution of these publications was made directly by ARI. Research Reports, Technical Reports, Study Reports, and Research Products were distributed primarily to operational and research facilities and their sponsors in DoD, to other interested Government agencies, and to DTIC; copies of some reports were also sent to the Library of Congress for distribution to libraries participating in the Documents Expediting Project. Research Notes and Study Notes were deposited with DTIC but were not published.

These publications are NOT available from ARI. DoD agencies and contractors can purchase paper copies or microfiche from:

Defense Logistics Agency
Defense Technical Information Center
8725 John J. Kingman Road, Suite 0944
Ft. Belvoir, VA 22060-6218
(703) 767-9030 or DSN 284-9030

Other Government agencies and the general public can obtain unclassified reports from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

This document was compiled and edited by David W. Witter and Jane C. Butler.

NOTE: When requesting copies of these reports, use the DTIC accession number (AD - - - - - - -) *appearing in parentheses following the date of publication of each citation.*

Technical Reports

TR 1009 Predicting Table VIII tank gunnery performance from M-COFT hit rate, Smith, M.D.; Hagman, J.D. October 1994. (AD A285 904)

To determine the relationship between scores on a device-based test of gunnery proficiency and live-fire Tank Table VIII scores, a pooled sample of 73 Army National Guard (ARNG) tank crews (i.e., 24 from Smith and Hagman (1992) and 49 from this investigation) completed a 1-hour gunnery proficiency test on the Mobile Conduct-of-Fire Trainer (M-COFT) and then fired Table VIII the next day as part of annual training. For this pooled sample, a significant correlation was found between M-COFT test and Table VIII scores ($r = .67$, $p < .0001$). Based on the results of linear regression analyses, a tool was developed to predict Table VIII scores from M-COFT test performance measured in terms of hit rate or, easier to calculate, percentage of first-round kills. Although field tryouts are needed to verify the accuracy of the predictions, the results in this report suggest that device-based prediction of live-fire tank gunnery performance is possible, and that this prediction capability can be used by ARNG company commanders to assess the proficiency of tank crews and their need for additional training before live-fire gunnery evaluation on Table VIII.

TR 1010 A review of the literature on part-task and whole-task training and context dependency, Teague, R.C.; Gittleman, S.S.; Park, O. October 1994. (AD A285 954)

For this report, the part-task and whole-task training and context-dependent and context-independent presentation literature was reviewed. For part-/whole-task training, the influences of early research on the selection of training methods relationships between training methods and task characteristics and trainees' individual differences, and different methods of part-task training were discussed. For context-dependent/independent presentation, early research findings, relationships between trainees' cognitive styles and the presentation methods, presentation methods and transfer of training, and presentation methods and trainees attention were discussed. Generally, the research showed that whole-task training is the preferred method if the task is simple and can be reasonably approximated by the trainee. However, if the task is dangerous or highly complex and can be easily divided into subtasks, part-task training is the better choice. Context-dependent methods are favored over context-independent methods for recall and recognition. However, if the acquired knowledge and skills must be selectively applied in a variety of situations, context-independent presentation methods are recommended.

TR 1011 Training dismounted soldiers in virtual environments: Task and research requirements, Jacobs, R.S.; Crooks, W.H.; Crooks, J.R.; Colburn, E.; Fraser, R.E. II; Gorman, P. F.; Maden, J.L.; Furness, T.A. III. October 1994. (AD A286 311)

For this report, research was conducted to investigate the suitability of virtual environments (VE) for individual combatant' training. The behaviors required by selected Dismounted Infantry and Special Operations Forces missions were linked to estimates of the availability of VE technology to support their performance. A baseline research plan was then developed as a series of vignettes in which research participants would perform the activities in

clusters with similar technology demands and performance characteristics. Subsequent experiments and demonstrations were proposed to combine the activities into complete Army Training and Evaluation Program tasks. Functional requirements for a VE testbed were identified, and possible hardware and software elements were defined. No missions or tasks can be fully supported by VE at this time, but most can be partially supported. This report provides a link between dismounted soldier tasks and estimates of the VE characteristics required to support their simulated execution and training This information will be useful in malting decisions about acquisition of or investment in the development of VE technology to support dismounted combatant training.

TR 1012 A device-based, time-compressed strategy for Army National Guard tank gunnery training, Morrison, J.E.; Hagman, J.D. October 1994. (AD A286 278)

This report describes a training strategy to reduce or compress the time needed to prepare for tank crew qualification on Table VIII through use of the Conduct-of-Fire Trainer (COFT) and Guard Unit Armory Device Full-Crew Interactive Simulation Trainer, Armor (GUARDFIST I). To compress time, the authors recommend that training (a) be focused on only those gunnery skills needed for Table VIII qualification, (b) be given only to crews with demonstrated performance deficiency, and (c) be devoted to those Table VIII engagements found to be most difficult. The strategy is designed specifically for use by armor units of the U.S. Army National Guard.

TR 1013 Interactive hypermedia for tactical training, Goehring, D.J. October 1994. (AD A286 051)

This effort applied the technology of hypermedia to the problem of organizing and presenting field training exercise data to provide training for military personnel using recent advances in informational science computer hardware and software technology. The data produced during a large-scale training exercise was structured into a hypermedia-based proof-of-principle system for training ground war tactics. The prototype lesson, which runs on a 286-based MS-DOS computer, features hypermedia structuring of textual information and high-resolution color static and dynamic graphics. The findings of this effort will contribute in several ways to future work in this area. (1) Future work can build directly upon the progress achieved in this project. (2) Guidelines are presented for resources necessary for a full-scale development of a tactical training system based on interactive hypermedia technology. (3) This project shows the value of a hypertextual approach as a way of organizing and integrating diverse types of training exercise data for use in computer-based training but with potential for a variety of other uses.

TR 1014 Measuring presence in virtual environments, Witmer, B.G.; Singer, M.J. October 1994. (AD A286 183)

A primary argument for the efficacy of Virtual Environments (VE) applications is that the user is "present" in the simulated environment. Presence is defined as the subjective experience of being in one environment (there) when physically in another environment (here).

Presence may be based on external factors and internal tendencies that support both awareness of the current situation and the transition from the immediate physical location (here) to a remote or artificial environment (there). These factors are labeled as immersive because they may lead to the experience of presence. Some major immersive factors identified in current literature or hypothesized as contributing to presence are briefly reviewed in this report. These concepts and ideas have been used as the basis for two questionnaires. An Immersive Tendencies Questionnaire (ITQ) was developed to investigate possible correlates that may indicate an individual's tendency to experience more or less presence in artificial environments. The Presence Questionnaire (PQ) addresses different factors or features peculiar to the artificial environment that may affect the experience of presence, or the capability to immerse oneself, in that environment. The results of administration of these questionnaires, in conjunction with an experiment on the performance of basic tasks in VE, are presented. These results should be considered preliminary and interpreted with caution because of the small number of subjects involved. Analyses indicate reasonable reliability values for the ITQ and PQ. An investigation of some subscales and performance measures indicates a relationship between some subscales and performance of movement and manipulation tasks. Correlations between the PQ and a standard Simulator Sickness measure revealed significant negative correlations both between the overall scores and several subscales. These results are discussed in connection with revisions made to the scales and plans for further research.

TR 1015 Predicting land navigation performance in the Special Forces qualification course, Busciglio, H.H.; Teplitzky, M.T. October 1994. (AD A289 792)

This research examined performance on the land navigation field test administered in the Special Forces Qualification Course (SFQC) as a function of three sets of possible predictors: (a) Project A paper and pencil tests of spatial ability (Map, Maze, and Orientation), (b) performance on the military orienteering events in the Special Forces Assessment and Selection program (SFAS), and (c) measures of intelligence and physical fitness obtained in SFAS. Our multivariate analyses showed that SFQC trainees who passed the land navigation test on the first try had significantly higher scores on the Map test than those who did not. We also found that those who failed land navigation had significantly lower ratings on orienteering Event IV (the last and longest event in SFAS) than did those who passed land navigation either on their first try or on a retest. Analyses of hypothetical cut-scores on the Map test were examined to provide information on the potential utility of this measure as a screening tool. The benefits (i.e., higher success rates when the cut-offs were used) were marginal because even very lenient cut-offs would exclude many students with the potential to pass land navigation. The Map test and military orienteering scores might, however, be useful as diagnostic tools. Students with low scores could be advised that they are likely to be at a disadvantage in the SFQC and instructed to improve their map reading and navigation skills before attending. For purposes of selection screening, we are planning research with another Project A spatial test, Assembling Objects, that has shown great promise in previous settings.

TR 1016 Personnel enlistment testing, job performance and cost: A cost-effectiveness analysis, Harris, D.A.; McCloy, R.A.; Dempsey, J.R.; DiFazio, P.F. October 1994. (AD A289 908)

The goals of this project were to (1) describe existing military selection and classification procedures, (2) formulate a set of alternative models, (3) develop an evaluation framework and associated criteria for comparing the cost-effectiveness of alternative models, and (4) assess the feasibility of the evaluation procedures. Previous reports addressed the first three goals. This report describes the pilot test of a cost-effectiveness model to evaluate alternative selection and classification models. The Selection and Classification Evaluation Model (S&CEM) considered both desired level of performance and the costs of obtaining that performance goal. The S&CEM combined performance prediction equations with training, compensation, and recruiting costs. Next, a linear programming algorithm was used to solve for the most cost-effective mix of recruits that would meet the performance goal. The effectiveness and efficiency of a single-stage simultaneous selection and classification model were demonstrated by evaluating four test batteries. The value of each test battery was estimated as the cost necessary to meet a fixed performance goal. Strengths and weaknesses of the S&CEM are discussed.

TR 1017 Tacit knowledge in military leadership: A review of the literature, Horvarth, J.A.; Williams, W.M.; Forsythe, G.B.; Sweeney, P.J.; Sternberg, R.J.; McNally, J.A.; Wattendorf, J. October 1994. (AD A291 140)

This report reviews the theory of tacit knowledge and its theoretical and empirical background. The authors propose a three-category structure for the tacit knowledge in military leadership: intrapersonal, interpersonal, and organizational. That structure was derived from instances of leadership tacit knowledge inferred from a review of military trade journals, military "lessons learned" publications, and military memoirs. The report presents instances for the three categories. The proposed structure and representing instances are discussed in terms of (1) tacit knowledge in civilian business management; (2) U.S. Army leadership doctrine; (3) applicability across organizational levels of the U.S. Army (battalion, company, and platoon); and (4) the likelihood of further elaboration and replication of the proposed structure with application of other data collection methods.

TR 1018 Tacit knowledge in military leadership: Evidence from officer interviews, Horvarth, J.A.; Forsythe, G.B.; Sweeney, P.J.; McNally, J.A.; Wattendorf, J.; Williams, W.M.; Sternberg, R.J. October 1994. (AD A289 840)

Eighty-one U.S. Army officers representing three organizational levels (platoon, company, and battalion) and all three branch categories were interviewed to elicit stories and observations revealing tacit knowledge for military leadership: the practical, action-oriented, leadership knowledge they had learned from practical experiences. Analyses of interview materials produced items of tacit knowledge for military leadership that were then cluster analyzed to identify groupings of knowledge. Results of the interviews are described with respect to patterns across leadership levels in the quantity, structure, and content of tacit knowledge for military leadership; implications of the patterns for development through experiential learning; and the functions of tacit knowledge in making concrete or augmenting Army leadership doctrine.

TR 1019 Effects of leader support in the work unit on the relationship between work spillover and family adaptation, Bowen, G.L. October 1994. (AD A289 859)

This research examines the direct and the buffering effect of leader support in the work unit on the relationship between work spillover and family adaptation. The analyses use data from a probability sample of 3,190 married soldiers in the U.S. Army who participated in the 1989 Army and Family Survey; the results are partitioned by the gender of the respondent. Two types of work spillover are examined in the analysis (energy and time interference), and both an internal and an external type of family adaptation are hypothesized and supported by the empirical analysis. Only modest support is found for the buffering effect hypothesis. Leader support buffers the negative effect of energy interference on the internal adaptation of female soldiers. In support of the direct effect hypothesis, the findings indicate that leader support in the work unit decreases perceptions of work spillover (a "preventive" effect and enhances perceptions of external adaptation (a "therapeutic" effect). In general, the nature and size of estimated effects are similar for males and females. Recommendations are offered for further research, and implications of the findings are discussed for improving the quality of leader support for soldiers in the unit.

TR 1020 Understanding problem solving strategies, Pounds, J.F.; Fallesen, J.J. November 1994. (AD A290 350)

The way in which problems are solved can have a dramatic impact on success. This report discusses the role strategies have in thinking processes, metacognition, planning, expertise, and decisions. The report also provides a description of each of 66 strategies identified in psychological studies. The strategies have been grouped into three classes with three subordinate categories each. The classes of strategies are managing information, controlling progress, and making choices. The categories include considering hypotheses, combining information, managing the amount of information, ordering processes by hierarchical structures, sequencing processes, ordering processes by merit, managing the number of options, using compensatory choice, and using non-compensatory choice. The report discusses the adaptive nature of strategies and how this information can be used to improve military problem solving. Notably, strategies have a specific contribution to make in the study of expertise, in defining decision aid requirements and in developing training programs. The principal conclusion was that existing definitions of strategies under represent everyday problem situations and that actual strategies need to be observed, defined, and assessed for improvement. A general plan of research is outlined for improving military problem solving.

TR 1021 Combat vehicle command and control system evaluation: Vertical integration of an armor battalion, Lickteig, C.W.; Collins, J.W. III. February 1995. (AD A292 718)

The U.S. Army is forging an integrated, digitally linked, force that will fight from a common real-time battle map to win the information war anticipated on the battlefield. Vertical integration that digitally links all echelons in a combat unit, such as a battalion, is required for full force integration. This Combat Vehicle Command and Control (CVCC) evaluation assessed the operational effectiveness of an armor battalion with digital connectivity between its platoon,

company, and battalion echelons. Two hundred ten soldiers in duty assignments participated, including a fully manned, point platoon operating under company- and battalion-level commanders. The operational setting comprised a series of offensive maneuvers that required the point platoon's high-tempo response in a dynamic battlefield setting. The findings indicate that vertically linked digital Command and Control (C2) systems provide significant advantages over voice-only communications on important battlefield functions under each of the tactical Battlefield Operating Systems tested: Maneuver, Fire Support, Command and Control, and Intelligence. The method used in this evaluation provided an example of how simulation-based technologies can meet future C2 training and evaluation requirements.

TR 1022 Training dismounted soldiers in virtual environments: Route learning and transfer, Witmer, B.G.; Bailey, J.H.; Knerr, B.W. February 1995. (AD A292 900)

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is conducting a research program with the goal of using virtual environments (VE) to train dismounted soldiers. To accomplish this goal, the conditions necessary for transfer of training from VE to real-world environments must be identified. This paper describes an experiment in which a VE computer model of a large office building is used to train spatial knowledge as it relates to learning routes through that building. This task is especially relevant to mission rehearsal of a hostage rescue attempt or other missions performed by Special Operations forces. Sixty college students studied directions and photographs of landmarks for a complex route, then rehearsed the route using either the VE model, the actual building, or verbal directions and photographs. Everyone was then tested in the actual building. Building trained students made fewer wrong turns than did VE-trained students, who in turn made fewer wrong turns and took less time to traverse the route than did verbally trained students. The results indicate that individuals can learn how to navigate through real-world places by training in a virtual environment.

TR 1023 Special Forces qualification course graduation and attrition statistics for soldiers selected for training in FY89-FY91, Diana, M.; Teplitzky, M.L.; Zazanis, M.M. February 1995. (AD A292 902)

The Special Forces Qualification Course (SFQC) Longitudinal Database tracks individuals and cohorts of individuals through the Special Forces (SF) assessment and training pipeline-from the Special Forces Assessment and Selection (SFAS) program through each attempt to successfully complete the SFQC. This report addresses six questions concerning individual graduation/attrition and recycle rates over time and across SF Military Occupational Specialties (MOS) for SFAS candidates selected from classes conducted between fiscal year 1989 (FY89) and FY91. Three results are especially noteworthy. First, examination of graduation rates shows 18D training to be the most difficult to complete, especially for lower ranking soldiers (i.e., Specialists). Second, there is a downward trend in graduation rates from FY89 to FY91; this decline is especially pronounced for the medic training track. Third, results show that soldiers from combat arms, as opposed to non-combat arms, backgrounds were more likely to succeed at the SFQC. The potential impact of these results for predicting how many

soldiers will make it through the selection and training pipeline and for identifying soldiers who are most likely to succeed is discussed.

TR 1024 Investigation of a background data measure of social intelligence, Zaccaro, S.J.; Zazanis, M.M.; Diana, M.; Gilbert, J.A. March 1995. (ADA298 832)

Some current measures of social intelligence have been judged as weak and ineffective, despite attempts to develop measures that do not emphasize verbal ability. This paper examines the construct validity of a background data, or life history measure, of social intelligence. Analyses suggest that the measure has high reliability, convergent validity with other measures of verbal intelligence. Criterion-related validity is supported using an individual's peer ranking of performance effectiveness in a team setting. Results suggest that further examination of a background data measure of social intelligence is warranted, and its relationship to individual performance should be investigated in a variety of appropriate team settings.

TR 1025 Virtual reality psychophysics: Forward and lateral distance, height and speed perceptions with a wide angle helmet display, Wright, R.H. April 1995. (AD A294 027)

Psychophysics of a color, high resolution, very wide angle, virtual reality type of helmet-mounted display were investigated. Subjects used a joystick to set their viewpoint within a computer-generated image database to requested target values in forward and lateral distance, height, and speed. Test factors for each type of perception included helicopter flying experience, replications, 3-D with familiar objects or 2-D texture visual databases, relative or absolute perceptions, viewpoint motion rail row and column offsets, increasing or decreasing change in target values, and six target values. Median forward distance and speed perceptions were 41% of simulated physical stimuli, 50% for lateral distance, and 72% for height. These accuracies contrast with typical real-world accuracies for similar ranges of about 90% for distance, height, and speed. Main effort differences between most of the test factor levels were highly significant for all four types of perceptions.

TR 1026 Survey of total Army military personnel (STAMP): Analysis of active duty and reserve/guard Army nurse corps data, Ramsberger, P.R.; DiFazio, A.S. May 1995. (AD A295 899)

Data collected from Army Registered Nurses (RNs) as part of the Survey of Total Army Military Personnel (STAMP) are examined in this report. The principal goal of the analyses was to isolate those factors related to retention decisions. That is, what are the correlates with the decision to remain in or leave the Army Nurse Corps (ANC). Because of the large volume of data collected as part of STAMP, a series of factor analyses were performed. For Active Duty personnel, 33 composites were formed; 26 were found for the Reserves. These were then entered into a series of multiple regressions along with individual variables that did not load on any of the factors. For both components, anxiety regarding the downsizing, job-satisfaction and commitment, years of service, and whether one anticipated serving during combat were significant predictors of retention plans. Family-related concerns entered into prediction equation for Active Duty personnel; concerns over future. mobilizations were important for

Reserve ANC officers. The conclusions suggest that Operations Desert Shield/Storm had little direct impact on the future plans of these nurses; however, they did appear to highlight the possibility of other deployments that, in turn, had an impact on retention decisions.

TR 1027 Simulator sickness in virtual environments, Kolasinski, E.M. May 1995. (AD A295 861)

Virtual Reality (also known as Virtual Environment or VE) technology shows many promising applications in areas of training, medicine, architecture, astronomy, data handling, teleoperation, and entertainment. A potential threat to using this technology is the mild to severe discomfort that some users experience during or after a VE session. Similar effects have been observed with flight and driving simulators. The simulator sickness literature forms a solid background for the study of sickness in virtual environments and many of the findings may be directly applicable. This report reviews literature concerning simulator sickness, motion sickness, and virtual environments. Forty factors that may be associated with simulator sickness in virtual environments are identified. These factors form three global categories: subject, simulator, and task. The known and predicted effects of these factors on sickness in VEs are discussed. A table summarizes the information presented in this report. The information can be used as a guide for future research concerning simulator sickness in virtual environments.

TR 1028 Canceled.

TR 1029 The virtual environment performance assessment battery (VEPAB): Development and evaluation, Lampton, D.R.; Knerr, B.W.; Goldberg, S.L.; Bliss, J.P.; Moshell, J.M.; Blau, B.S. June 1995. (AD A297 277)

The Virtual Environment Performance Assessment Battery (VEPAB) is a set of tasks developed to support research on training applications of VE (Virtual Environment) technology. VEPAB measures human performance on vision, locomotion, tracking, object manipulation, and reaction time tasks performed on three-dimensional, interactive VEs. It can be used to provide a general orientation for interacting in VEs and to determine entry-level performance and skill acquisition of users. In addition, VEPAB allows comparison of task performance, side effects and aftereffects, and subjective reactions across different VE systems. By providing Benchmarks of human performance, VEPAB can promote continuity in training research across different technologies, separate research facilities, and dissimilar subject populations. This report describes the development of VEPAB and summarizes the results of an experiment to test the sensitivity of the tasks to differences between input control devices and to examine practice effects.

TR 1030 Evidence for an interpersonal knowledge factor: The reliability and factor structure of tests of interpersonal knowledge and general cognitive ability, Legree, P.J.; Grafton, F.C. September 1995. (AD A299 659)

Many aptitude scales measure general or academic knowledge and utilize a forced choice response format in which answers are scored as either correct or incorrect. In contrast to this

traditional scoring procedure, quantifying performance on scales developed to measure interpersonal skills requires the opinions of multiple experts, and individual responses cannot be easily or unambiguously evaluated. Given this type of uncertain knowledge domain, a Likert procedure was modified to measure expertise based on the distance between expert and subject ratings of the relative strengths of a set of probabilistic relationships. In Phase 1, data were collected and indicate that an improvement in the reliability of an existing measure of leadership could be traditional forced choice format. In Phase 2, data were collected with the leadership scale and two additional interpersonal knowledge scales using Air Force recruits for whom Armed Services Vocational Aptitude Battery (ASVAB) data were available. Confirmatory factor analyses indicate that the factor structure of the 13-test battery (ASVAB plus the experimental scales) could be best explained by hypothesizing the existence of a separate interpersonal knowledge factor in addition to the four factors that are typically extracted from the ASVAB. These results demonstrate (1) the applicability of the Likert response format to efficiently measure individual differences in nontraditional knowledge domains such as interpersonal skills, and (2) the existence of a separate first-order factor that is labeled Interpersonal Knowledge.

TR 1031 Training strategies for tactical pattern recognition, Fischer, S.C.; Geiwitz, J. February 1996. (AD A315 267)

The purpose of this research was to evaluate the effectiveness of pattern recognition training on Army officers' knowledge and skill of terrain situation assessment.

TR 1032 Evaluation of an unaided night vision instructional program for ground forces, Dyer, J.L.; Gaillard, K; McClure, N.R.; Osborne, S.M. October 1995. (AD A304 276)

An unaided night vision program for ground forces was developed to reduce current training deficiencies in instructional materials and the training literature. The program is presented in the dark and demonstrates visual problems at night and how to overcome them. Two experiments with experienced soldiers showed the program increased soldier knowledge by 40% regardless of Army experience and can be given effectively by military instructors. Content designated as more important was acquired better than less important content. The program had a stronger effect on demonstration-related and technical material than on soldiers' ability to apply night vision concepts to new situations. Baseline results with experienced soldiers showed their knowledge of unaided night vision was fragmentary and limited. An experiment comparing the program to a text version showed that Infantry trainees with low verbal ability benefited more from the program itself than the text version; trainees with high verbal ability benefited more from the text version. Relatively little forgetting occurred over a 3-week period. Knowledge gained from the program can be applied directly to improve soldier performance and to refine unit standard operating procedures for night operations.

TR 1033 Development of a roadmap for special forces selection and classification research, Russell, T.L.; Crafts,, J. L.; Peterson, N.G.; Rohrback, M.R.; Nee, M.T; Mael, F October 1995. (AD A317 151)

The purpose of this project was to develop an agenda for Special Forces (SF) selection and classification research. Job analysis data, interviews, field observation, and expert judgments about the quality of measures formed the foundation for the Roadmap. The resulting Roadmap is composed of eight projects. Projects 1 and 2, Concurrent Criterion-Related Validation of Readily Available Predictor Measures Against on the Job Performance and Development and Implementation of Content Valid Job Sample Tests, supplement SF selection and classification with measures of leadership, temperament, and communication and analytic skills that could be implemented quickly. Project 3, Validation of Measures of Conventional Army Task Proficiency, Experience and Preference Against Training Performance, addresses the fit between individuals and SF Jobs. Project 4, Validation of Training Performance Against on the Job Performance, would evaluate the usefulness of training data for predicting job performance. Project 5, Predictive Validation of All Predictors Against on the Job Performance, the ultimate test of any selection system, requires maintaining databases for validation purposes. Projects 6-8 involve the development of information to facilitate decision making at the U.S. Army John E Kennedy Special Warfare Center and School. The are: Development of a Selection and Training Decision Simulator (Project 6), Review of New Measures of Leader Problem Solving Performance (Project 7), and Training Performance Study (Project 8).

TR 1034 Task performance in virtual environments: Stereoscopic versus monoscopic displays and head-coupling, Singer, M.J.; Ehrlich, J.; Cinq-Mars, S.; Papin, J. April 1996. (AD A306 720)

The U.S. Army Research Institute for the Behavioral and Social Sciences has an ongoing program of investigation into the requirements for using Virtual Environments (VE) to train dismounted soldiers. As a part of this program, an experiment was conducted investigating the effects of different parameters of VE in the performance of simple, representative tasks. This report provides background information about VE display problems, head-coupling in VE, presence, field dependence, and simulator sickness. The tasks used in the experiment are generic to performance in VEs and would form the basis both of training programs and general soldier tasks.

TR 1035 An exploration of psychological and psychophysiological measures as predictors of successful performance under stress, Heslegrave, R.J; Colvin, C. January 1996. (AD A306 788)

Based on a review of the literature and the development of a new psychophysiological model to account for individual coping responses to stress, two investigations were conducted. The first investigation developed and validated a new Occupational Stress Assessment Inventory that better examined stress in an occupational context with measures of active coping and ability to deal with stress built into the same instrument. In the second investigation this new inventory as well as other personality measures were employed in a psychophysiological stress paradigm to directly assess the predictive power of personality and psychophysiological measures with respect to predicting performance under stress. The second investigation showed that several psychophysiological variables, such as heart rate, vagal tone, and mean arterial and diastolic blood pressures, predicted performance on both simple and more complex tasks with

correlations as high as .67. These results demonstrated that there are marked individual differences in psychophysiological responses under stress that reliably predict performance. In terms of personality measures, the data indicated that those individuals who perceived themselves as having more of an ability to cope with stress and who more actively cope with stressful situations indeed are more successful performers. These investigations support the contention that selection and classification for stressful occupations can be improved by the integration of specific personality and psychophysiological measures. It was recommended that a full field evaluation of these methods be conducted to assess the validity of these findings in specific populations of interest and to evaluate their practical feasibility.

TR 1036 Questionnaire measuring the utility of knowledge-based systems, Adelman, L.; Gualtieri, J.; Riedel, S.L.; Trent, A.P January 1996. (AD A309 015)

This paper describes the development and validation of an off-the-shelf questionnaire designed to be tailored, as needed, to obtain the opinions of potential users of knowledge-based systems. Development began with a literature review to identify criteria used by different researchers to assess system utility and usability. The identified criteria then were organized into a multi-attributed hierarchy with the top three dimensions being Effect on Task Performance, System Usability, and System Fit. The bottom-level attributes were used to develop the questions for assessing system utility. In May 1994, the questionnaire was successfully tailored and used by the Army's Battle Command Battle Laboratory to evaluate 11 decision aiding prototypes. The questionnaire distinguished between those prototypes the soldiers liked and those that they did not. Psychometric analyses indicated the questionnaire passed required tests for reliability and validity.

TR 1037 Practical thinking: Innovation in battle command instruction, Fallesen, J.J.; Michel, R.R.; Lussier, J.W; Pounds, J. January 1996. (AD A310 096)

Instruction on practical thinking skills was developed and implemented in a Command and General Staff Officers Course on Battle Command. A cognitive skills approach was emphasized as opposed to the traditional procedural models used in other Army education programs. The cognitive skills were identified from study of tactical planning and decision making, review of civilian cognitive skill instruction programs, and the application of new models of naturalistic decision malting. The program consisted of 12 hours of instruction and six meetings. Practical thinking consists of creative and critical thinking. It is based on natural ways of thinking such as considering multiple perspectives, adapting thinking to situations, looking for hidden assumptions, and following guidelines for reasoning. This report describes the General Officer tasking that led to this work, the identification of requirements for practical thinking, description of the lessons, experience with using the program, and recommendations for further pursuit of improving practical thinking skills.

TR 1038 Analysis of CTC archive data for critical leader behaviors, Jarrett, P.A. February 1996. (AD A307 220)

The ARI-CTC Archive contains records of exercises conducted at the U.S. Army Combat Training Centers (CTCs). The information contained in the archive was used to examine critical leader behaviors in the art of battle command. Some factors that were found to influence the commanders ability to see the battlefield are setting and enforcing standards of subordinate reporting and staff planning, and the commanders ability to use and trust subordinates. The commander's ability to focus the staff and subordinate effort is also discussed as a critical leader behavior. Trends in the use and quality of commander's intent and mission statements are reported. Additionally, six missions were described in detail as case studies which illustrate critical leader behaviors.

TR 1039 Environmental intensity, stress, and training, Teague, R.C.; Park, O. February 1996. (AD A310 297)

Stress and its effects on task performance and on human physical and mental well-being have received a great amount of attention. The majority of the efforts directed at reducing the negative effects of stress have either been after-the-fact treatments of individuals exposed to stress or time out methods that include relaxation and communication techniques. While these have been shown to be useful techniques, their effectiveness is limited. Certain tasks do not allow for time out exercises, and only treating individuals after the fact does not remove the negative effects of stress on performance. There is a need, then, for preparing individuals to perform in environments in which stress and its effects can negatively influence performance and the task that does not allow for time out exercises. This paper discusses methods for training individuals for performance in an intense environment. Phased-intensity and graduated-intensity training are discussed in detail. Phased-intensity training allows the trainees to practice the basic skills without any level of intensity present and then to experience the intensity level that the trainee will encounter in the actual task performance situation. Graduated-intensity training presents intensity throughout training with a gradual increase as training continues. This review points out the flexibility and ease with which intensity of the training environment can be presented using simulators.

TR 1040 Antecedent predictors of a "full range" of leadership and management styles, Avolio, B.J.; Dionne, S.; Atwater, L.; Lau, A.; Camobreco, J.; Whitmore, N.; Bass, B.M. March 1996. (AD A316 556)

This report examines relationships between the leadership of entering leaders and antecedent measures of personality, ability, temperament, interpersonal style, experience, and physical fitness. The data described a sample of cadets/students during their first 2 ½ years of education and military training at a state military college. The primary purpose was to track longitudinally leader development and emergence and, in this reporting of the data, to identify antecedents which differentiate cadets characterized by a transformational leadership style from those cadets more characterized by transactional styles of leadership. Results suggested potential discriminators, but more definitive trends will possibly appear as the cadets progress in education and transition into positions with greater leadership discretion.

TR 1041 An exploration of the construct validity of a leadership behavior rating system, Schwager, E. H.; Evans, K. L. August 1996. (AD A310 259)

The construct validity of a leadership behavior rating system used by the U.S. Military Academy (USMA) was examined as a prelude to a longitudinal program of research on leadership development. Their system centers on Cadet Performance Report (CPR) ratings made by superior, peer, and subordinate raters. CPR ratings include individual scores on 12 leadership behavior dimensions and a global score of performance. Two CPR dimensions, duty motivation and military hearing, were found to be most strongly related to the CPR global score and the leadership grade, which is USMA's official evaluation of a cadet's overall performance in a leadership role. Different types of raters seemed to focus on different dimensions when evaluating overall leadership performance. Additionally, four broader factors were found to underlie the 12 CPR dimensions. The findings offer some evidence of the construct validity of the CPR dimensions for measuring cadet leadership performance.

TR 1042 Tacit knowledge in military leadership: Supporting instrument development, Horvarth, J. A.; Sternberg, R. J.; Forsythe, G. B.; Sweeney, P. J.; Bullis, R.C.; Williams, W M.; Dennis, M. August 1996. (AD A310 258)

Army officers, drawn from three different institutional settings, evaluated tacit-knowledge items to support development of tests of tacit knowledge for military leadership. Items were identified that differentiated leaders varying in leadership experience (at a level of leadership) or in rated leadership effectiveness. Subject-matter experts also sorted the items into categories of like items. Analyses of the categories identified dimensions that described the organization of the items. Item discrimination and organizational location will be used to select materials for construction of tests of tacit knowledge for each three levels of Army Leadership: platoon leader, company commander, and battalion commander.

TR 1043 Demonstrating the concept of an automated training analysis and feedback system, Brown, B.; Wilkinson, S.; Nordyke, J.; Hawkins, R.; Robideaux, B.; Huyssoon, S. August 1996. (AD B215579)

LB&M Associates developed a prototype Automated Training Analysis and Feedback System (ATAFS) to automate After Action Review (AAR) preparations. ATAFS is an expert system designed to relieve the burden on observer/controllers (O/Cs) in monitoring and assessing player performance during armor platoon simulation networking (SIMNET) exercises. ATAFS permits the O/C to observe the exercise in near-real time or to examine past events in exercise history, as the system continues to archive the exercise. The system also plays back voice communications synchronously with top-down views of the player unit's activities. ATAFS automatically generates AAR products during the exercise and provides the capability for the O/C to edit these aids at the end of the exercise. This report describes the design of the ATAFS concept and development of a proof-of-principal prototype during two phases of a Small Business Innovative Research (SBIR) effort.

TR 1044 Leader attributes and behavior predicting emergence of leader effectiveness, Atwater, L E.; Dionne, S. D.; Avolio, B. J.; Camobreco, J. R; Lau, A. W. August 1996. (AD A318 129)

This report examines relationships between the leadership of entering leaders and antecedent measures of personality, ability, temperament, interpersonal style, experience, and physical fitness. The data described a sample of cadets/students over the course of their education and military training at a state military college. The primary purpose was to track longitudinally leader development and emergence and to identify individual characteristics and leadership behaviors that differentiated the leadership position and leadership effectiveness attained by the cadets. Results showed that individual characteristics, with some measured at college entry, predicted position attainment and rated (peer) leadership effectiveness. Results also showed that transformational behavior, as well as transactional leadership behavior, characterized cadets emerging as leaders.

TR 1045 An experiment investigating the effects of requesting-versus. not-requesting demographics in an anonymous Army survey on sensitive topics, Savell, J. M.; Bright, A. J. August 1996. (AD A319 451)

The research sought evidence on the following hypothesis derived from previous research: Including standard military and social demographic items in an Army survey (a) increases respondents, concern about anonymity (pro3dmal effect) and (b) leads respondents to respond to sensitive items in a more cautious and socially desirable manner (distal effect). Subjects were 100 enlisted soldiers E2-E4. The experimental manipulation was validated, and some proximal effects were demonstrated. The hypothesis concerning the distal effect, however, was only partly supported. Possible explanations for the results are discussed, along with suggestions for further research.

TR 1046 Preliminary report on selected life course variables and reasons for volunteering for the 28th Sinai deployment, Oliver, L. W; Tiggle, R. B.; Hayes, S. M. August 1996. (AD A320 362)

This report documents the before-deployment to the Sinai, a peacekeeping operation that comprised troops from the Reserve Component (RC) as well as the Active Component (AC). Before deploying, 503 soldiers completed surveys developed by the U.S. Army Research Institute for the Behavioral and Social Sciences tat contained items covering a broad range of demographic and attitudinal variables. The findings of this report concern the reasons RC soldiers gave for volunteering; the expected effects of the deployment on the lives of all soldiers; and all deployees before-deploying educational aspirations, career intentions, organizational commitment, and marital/family status. RC soldiers' reasons for volunteering involved adventure, career challenge/advancement, and patriotism. The entire sample of soldiers expected the deployment to have positive effects on various aspects of their lives, especially their physical health and their military careers. Levels of organizational commitment and career intentions were high across the entire sample. Married soldiers reported high marital satisfaction and high levels of spouse support for the deployment. Differences among subgroups tended to

be small, although RC soldiers were generally more positive than AC soldiers, and officers were more positive than enlisted personnel. There were few substantive differences among the soldiers on the variables examined. The authors conclude that before-deployment status on the selected variables is roughly equivalent for the entire sample of deployees across both components (RC and AC) and all three rank levels Senior enlisted personnel, noncommissioned officers, and officers.

TR 1047 Research methods for advanced warfighting experiments, Lickteig, C. W - August 1996. (ADA319 414)

Advanced Warfighting Experiments (AWEs) typify the Army,, emerging need for more pragmatic and responsive research methods to address the changing climate of military research and improve future force capability. Formative force improvement enables or mediates the summative objective--a more capable force. To help achieve the primary objective, this report recommends the AWEs adapt formative evaluation methods that focus on exploration, explanation, and improvement. This report identifies a set of key fundamental and formative method issues for the AWEs and provides corresponding method recommendations for more reliable and useful AWE findings. The report's method recommendations embed a mechanism of expanded AWE evaluation teams that implement lessons learned into "living products" for Army-wide Force XXI efforts.

TR 1048 Interim report on deployee attitudes and perceptions during the 28th Sinai deployment, Oliver, L. W; Hayes, S.M.; Tiggle, R. B. September 1996. (AD A318 687)

This report documents the during-deployment status of soldiers serving in the 28th deployment to Sinai, a peacekeeping operation that comprised troops from the Reserve Component (RC) as well as the Active Component (AC). During deployment, 412 soldiers completed the survey containing demographic and attitudinal variables Similar to ones in surveys administered before the deployment.

TR 1049 Effects of Display Type on Performance in Virtual Environments, Lampton, D,R.; Gildea, J. P, McDonald, D. P, Kolasinski, E.M. October 1996. (AD A322 046)

This research was conducted as part of a program to determine interface requirements for enabling dismounted soldiers to train in Virtual Environments (VEs). We compared different VE display devices in terms of their effects on task performance, skill acquisition, and side effects. Forty-eight college students completed a series of visual and psychomotor tasks, a subset of the Virtual Environment Performance Assessment Battery (VEPAB), using either a Head-mounted Display (HMD), a head-tracked boom-mounted display, or a standard computer monitor. Performance on vision tasks was sensitive to differences in display devices and to individual differences. Visual acuity scores were ordered according to estimates of the resolution of the displays, but were worse than what would be predicted from the resolution estimates. In comparison to real-world performance, distance and height estimation in the VEs varied greatly across participants, especially with the HMD. Motor tasks had high reliability, demonstrated small but significant practice effects, and were correlated with participants' use of

computers and video games. Unexpectedly, even the standard monitor group showed a significant increase in simulator sickness scores. The VEPAB tasks should prove useful in the future when design tradeoffs must be made in the process of developing training system prototypes.

TR 1050 Training Critical Thinking Skills for Battlefield Situation Assessment: An Experimental Test, Cohen, M.S.; Freeman, J.T.; Fallesen, J.J.; Marvin, FF.; Bresnick, T.A. October 1996. (AD A320 892)

In battlefield situation assessment, officers must interpret information that is incomplete, unreliable, and often conflicting and gather new information to improve their assessments and plans. In previous work, a framework for these cognitive activities was developed based on interviews with activity-duty command staff, and a training method was developed. That training helped officers to find and assess the reliability of hidden assumptions and to resolve conflicting evidence. Forty-three U.S. Army officers participated in an experimental training study with scena6o-based tests. Trained officers generated more accurate arguments concerning a given assessment than did controls. Improvements in quality were related to the increased relevance of their judgments. In some problems, training countered a tendency to change hypotheses too readily; in other problems, training countered a tendency to hold on to a hypothesis too long. Training did not decrease confidence in evaluations, nor did it hypersensitize officers to information.

TR 1051 Canceled.

TR 1052 Canceled.

TR 1053 ASVAB Correlations Are Lower for Higher Aptitude Groups, Legree, PJ.; Pifer, M.E.; Grafton, FC. January 1997. (AD A328 529)

Previous research demonstrates that correlations among IQ tests are lower when estimated using higher scoring individuals (Detterman & Daniel, 1989; Lynn, 1990). However, this phenomenon has only been documented using individually administered measures of intelligence, and attempts to extend the demonstration to other specialized aptitudes have failed (Detterman, 1993). The present study divides the 1980 Armed Services Vocational Aptitude Battery (ASVAB) weighted norming sample into five aptitude levels with similar levels of variance. Analyses show that the ASVAB tests are less correlated within higher aptitude groups provided that the scales used to define the groups are psychometrically sound: for three highly skewed ASVAB tests, a ceiling effect prevents this phenomenon; for the remaining seven tests the phenomenon replicates; and the magnitude of the effect is proportional to the skewness of the scale, $r = .85$. These findings support the assertion that cognitive aptitudes are less correlated in higher aptitude groups, imply that greater classification effects can be associated with higher scoring groups, and qualify the use of the multivariate correction for restriction of range.

TR 1054 Economic Life Course Analysis of Peacekeeping Deployment in the Sinai, Lakhani, H.; Tartak-Abod, E. January 1997. (AD A323 250)

This report has two objectives. The first objective is to estimate the extent of financial gains or losses of Active Component (AC) and Reserve Component (RC) soldiers for the Multinational Force and Observers (MFO) peacekeeping mission in the Sinai. The second objective is to estimate the effect of these gains/losses on soldiers' intentions to remain in their respective component until retirement. Data for a population of approximately 500 soldiers were collected during their predeployment training at Fort Bragg, NC and during deployment at the South Camp in the Sinai. Results of these analyses revealed that AC soldiers perceived a small financial loss ($102 per month) and RC soldiers perceived considerable financial gain ($335 per month). Therefore, soldiers experienced net average financial gains ($233 per month). Regression results for change in financial status revealed that civilian earnings were negatively related to financial gains of the RC. Regression results for career commitment revealed that the soldiers' likelihood of staying in their respective component until retirement increased with financial gains, while statistically controlling for satisfaction with Army life and demographic variables.

TR 1055 An Additional Metric for Communicating Group Performance Differences, Silva, J.M. February 1997. (AD A328 532)

The common practice of expressing group performance differences in standard deviation units conveys useful but limited information. Reporting the percentage of the time a member from a lower-performing group is expected to outperform a member from a higher performing group would enhance understanding of the magnitude of the difference. Furthermore, the proposed percentage metric is able to easily deal with group variability differences in addition to mean group differences. An analytical approach was used to convert group performance differences from standard deviation units to the proposed metric. The slope of the relationship between the two metrics is nearly linear through a one standard deviation group performance difference. Tables are presented that can be used to convert group performance differences in standard deviation units to the new metric.

TR 1056 Terrain Appreciation in Virtual Environments: Spatial Knowledge Acquisition, Singer, M.J.; Allen, R.C.; McDonald, D.P,, Gildea, J.P. February 1997. (AD A325 520)

The U.S. Army Research Institute for the Behavioral and Social Sciences is investigating the requirements for using Virtual Environments (VE) in training dismounted soldiers. This experiment investigated the effects of different VE parameters on spatial knowledge acquisition by comparing learning in advanced VE, restricted VE, and standard map training. This report also provides information about VE displays, head-coupling, presence, and simulator sickness associated with spatial knowledge acquisition in VE. The activities used during the learning phase of the experiment are generic to dismounted soldier activities. The high-level virtual environment (Hi-VE) condition had a Stereoscopic Head-Mounted Display (HMD) with fully head-coupled gaze control and treadmill-based movement control. The restricted VE configuration (Lo-VE) used the same HMD with both gaze direction and viewpoint movement

controlled by a joystick. The map training participants used expanded topographical maps and were subsequently tested in the HI-VE configuration. Participants were all trained on the definitions and representational configuration of a reduced set of topographical features and dismissed if unable to reach a minimum criterion. The Simulator Sickness Questionnaires (SSQ) and the Immersive Tendencies Questionnaire (ITQ) were administered before the VE experience. Participants received training in VE movement and control before the experiment.

TR 1057 Learning in a Synthetic Environment: The Effect of Visual Display, Presence, and Simulator Sickness, Johnson, D. M. February 1997. (AD A328 285)

Soldiers explored a synthetic representation of an Army heliport under three visual display conditions: (1) wide field of view (FOV) helmet-mounted display, (2) narrow FOV helmet-mounted display, and (3) stationary, wide-screen display. Pretest and posttest measures of spatial knowledge were recorded. Measures of presence in the virtual environment were recorded. Measures of simulator sickness were administered upon exit from the virtual environment and 24 hours later. Overall, soldiers acquired a significant amount of spatial knowledge from the synthetic representation. When transferred to the actual Army heliport, soldiers were able to navigate around the location with near-zero errors. There was no effect of visual display on any measures of spatial knowledge. Also, there was no effect of visual display on reported presence or simulator sickness. Simulator sickness was significantly reduced after 24 hours away from the virtual environment. Presence did not correlate with spatial knowledge. Simulator sickness correlated negatively with spatial knowledge. Presence and simulator sickness were negatively correlated.

TR 1058 Estimating AFQT by Telephone Using a Computer Adaptive Test, Legree, PJ.; Fischl, M.A.; Gade, PA. March 1997. (AD A328 971)

A computer adaptive test was administered over the telephone by reading items and response alternatives to 144 individuals who had recently enlisted in the U.S. Army and had completed the Armed Services Vocational Aptitude Battery (ASVAB). Subject responses were entered into a computer by the telephone interviewer, thereby allowing the adaptive test program to estimate aptitude with approximately 10 verbal items. Analyses indicate that the Telephone Test is highly correlated with the Armed Forces Qualification Test (AFQT) in the sample we tested, r=.66; the bivariate correction for range restriction estimated this population correlation to be .81. A confirmatory factor analysis produced a four factor solution with the Telephone Test loading at a very high level (.91) on a Verbal factor, which had a substantial loading (.72) on a higher order factor. The magnitude of the factor loadings and the administration time (5 to 10 minutes) indicate that the procedure provides an excellent measure of crystallized Verbal aptitude that can be incorporated into brief telephone interviews and used to estimate AFQT and general aptitude.

TR 1059 Using Psychomotor Ability for Selecting TOW Gunners, Silva, J.M. March 1997. (AD A328 697)

The research examined the incremental validity of a psychomotor tracking test when added to traditional Army measures of cognitive ability. In addition, the actual gunnery performance of 911 TOW Gunners assigned with current procedures from a pool of 10,852 Infantrymen was compared to the predicted performance of 911 TOW Gunners hypothetically assigned on the basis of general cognitive ability (*g*) and tracking ability. Increments in validity resulting from the use of the tracking test were found, although the magnitude of the increases were smaller than expected. However, the increments resulting from hypothetical assignment using the tracking test were substantial. Whether TOW Gunner performance prediction was based on *g*, tracking score, or both, top-down hypothetical assignment of Infantrymen as TOW Gunners resulted in a significant improvement in predicted TOW Gunner gunnery performance and successful completion of training. If assignment as a TOW Gunner was based on tracking ability and was made from the full applicant pool rather than from those first assigned as Infantrymen, it is likely that TOW Gunner performance could be improved with no loss in performance in other military occupations. This is true even if gunnery performance in other Infantry occupations also depends on tracking ability. Implications for classification and job clustering are discussed.

TR 1060 Canceled.

TR 1061 Assessment of User Reactions to the Multi-Service Distributed Training Testbed (MDT2) System, Mirabella, A.; Sticha, P.; Morrison, J. April 1997. (AD A328 473)

This research was part of a larger program to develop a methodology for multi-Service training of Close Air Support (CAS), using Distributed Interactive Simulation (DIS) technology. This paper summarizes an assessment of user reactions to the training. Survey questionnaires, group interviews, and observations of the training were used to obtain data on two questions. What value is added to existing Service training cycles by the DIS methodology developed? How well did the training work? A key finding was that the distributed methodology fills a critical gap in training multi-Service CAS coordination tasks. An important potential application of the research is to "ramp-up" training in preparation for rotations to combat training centers. Many lessons were learned about how to develop and apply survey and interview instruments as part of a larger evaluation of DIS training. For example, we "discovered" that for multiple sites and services "one size does not fit all." Assessment instruments must be carefully prepared in different versions to suit the varying perspectives and roles of multiple services.

TR 1062 Analysis of Battlefield Operating system (BOS) Statements for Developing Performance Measurement, Mirabella, A. April 1997. (AD A328 076)

This study was an initial effort in a larger program to develop training feedback measures and decision support methodology (DSM) for selecting brigade training strategies. Essential to either purpose is a set of reliable and valid unit performance measures. Such measures have traditionally been derived from front-end analysis. But archival data from the National Training Center (NTC) make possible a new, complementary approach of deriving measures from exercise data. In this study Battlefield Operating System (BOS) Impact Statements were used to derive unit performance measurement concepts. It was found that Impact Statements can be

used reliably to judge relative unit performance across exercises, can be related to mission outcome, and can be used as a basis for deriving improved measures for training feedback and training effectiveness.

TR 1063 Estimating Personality Constructs from Archival Data, Evans, K.L. April 1997. (AD A328 816)

As part of a leadership research program at the U.S. Military Academy involving cadets in the Class of 1998, this report examined the viability of using archival data on prior cadets to estimate a variety of personality constructs among current cadets. Two sets of archival personality data on prior cadet classes were obtained. The first involved a short form administration of the ABLE inventory to cadets in the Class of 1994. The second involved the administration of the NEO Personality Inventory to the Class of 1996. Scores on the 12 scales contained in these inventories were used as archival criteria. Archival predictors were then sought from other survey and questionnaire items administered to cadets at the same point in time as the original inventories. For each scale, a different 20-item pool of predictors was developed from the archival items having the strongest zero-order correlations with that scale. A series of multiple regression analyses was then used to predict scores on each scale. An average R^2 of .39 per scale was obtained after cross-validation. Both the original scales and their analogs tended to manifest similar relationships with two external criteria examined, leadership performance and attrition.

TR 1064 Simulation-Based Communications Realism and Platoon Training in the Close Combat Tactical Trainer (CCTT), Finley, D. L, June 1997. (AD A337 692)

Training needs have long existed for skills in tactically dealing with variations in communications capability that occur on dynamic battlefields. These communications realism training needs are becoming more critical with the many advances in electronic communications technology. The new Close Combat Tactical Trainer (CCTT) will be the first training environment developed to simulate variations in electronics communications quality as would occur realistically. The CCTT was used to examine tactical communications training needs and simulation-based training strategies for Armor and Mechanized Infantry platoons. Communications realism simulation capabilities of an initial version of the CCTT were then evaluated in light of these training needs and strategies. Overall communications realism training requirements for warfighters were found to constitute a general model that effectively served as an instrument to define platoon training requirements. Structured training was identified as the most appropriate training. It is recommended that these stages be designed into vignettes or tables integrated into exercises developed to meet platoon training goals related to maneuver and engagement. Possible enhancements to CCTT's simulation of communications realism were also identified and their potential payoffs discussed.

TR 1065 Does Thinking About the Values of One's Peers Make These Values Seem More Important? Savell, J. M. May 1997 (AD A329 110)

This experiment investigated the effect of peer-reference-group salience on the judged importance of specified values using a sample of 143 male and female African-American high school seniors. In half the cases, students first judged the importance of these values to themselves and then judged the importance of these values to their friends. In the rest of the cases, students first judged the importance of the values to their friends and then judged the importance of the values to themselves. Students who gave their own judgments in second position (and thus had a chance to think about these friends and their values before indicating their own judgments) gave own judgments that were closer to the judgments they attributed to their friends than did those who gave their own judgments first ($p<001$). Students attributed to their friends a level of interest in joining the military that was similar to their own, but the peer-salience variable seemed not to have an effect. An unpredicted finding was that neighborhood socioeconomic status was negatively correlated ($r=.43$, $p<001$) with the absolute difference between own and attributed likelihood of joining the military, although it was uncorrelated absolute difference between own and attributed likelihood of joining the military, although it was uncorrelated ($ps>.05$) (a) with the subject's own likelihood of joining, (b) with the likelihood they attributed to their friends, and (c) with the arithmetic difference between these two values.

TR 1066 Discerning Critical Information: A Prairie Warrior '96 Case Study, Simpson, D.; Fallesen, J.J. May 1997. (AD A337 669)

The increased attention to technologies for battle command has brought about an increased awareness of the importance of abilities and traits for leadership and tactical decision making. This study examined the relationship between conceptual capacity and the ability to discern critical information. Conceptual capacity was measured with a cognitive complexity method that used self-report and clinical judgment. Critical information discernment (CID) was measured by instructors and trained observers during a Command and General Staff Officer College exercise (Prairie Warrior '96). Self and peer ratings were also collected on leadership skills, personality and attitudes, CID performance, and experience. No relationship was found between the primary measure of the current level of conceptual capacity and CID; however, a Biodata cognitive complexity measure was negatively correlated to CID. About one-half of the variance in CID performance was explained by seven variables. Variables that contributed positively were analytic style, rank of position in the exercise, and whether performance was expected to apply to their next assignment. Negatively weighted factors were openness, object orientation, staying alert for unusual information, and feeling time pressured.

TR 1067 A Prototype Procedure for Optimizing Training Strategies, Matto, E.J.; Moses, F.L. June 1997. (AD A328 664)

For military units to be combat ready, they must be proficient in a collective set of tasks trained at various events. This report presents a research too] called the Training Strategies Optimization Prototype (TSOP) that shows potential to aid commanders in making decisions about how to improve strategies and schedules of training. TSOP was developed to determine whether available Army training data re adequate for systematically deriving alternative training strategies to meet commanders' needs. The prototype uses Army battalion-level units, but is adaptable to scheduling problems at other echelons within the Army, for other services, and even

for joint applications. This report illustrates TSOP's ability to provide the decision maker with an analytical means by which to schedule training events while considering both performance requirements and resource constraints. In many cases, the maximum level of troop proficiency may be attained through more than one combination of training events. TSOP is designed to allow the decision maker to identify the training strategy to attain and sustain troop proficiency within available resources.

TR 1068 Examining the Feasibility of Developing Measures of Stress Adaptability, Pulakos, E.D.; Arad, S.; Plamondon, K.; Kiechel, K.L. July 1997. (AD B233 957)

The goal of this effort was to examine and specifically define the construct of work-relevant adaptability and to explore the feasibility of developing innovative, computer-administered predictors of adaptability. To define work-relevant adaptability, project staff content analyzed thousands of critical incidents to develop and define adaptability dimensions. Eight adaptability dimensions were defined. A literature review was also conducted, focusing on literature relevant to individual difference constructs, as well as social, psychological, cognitive, and other literature to identify the constructs that may be important determinants of the ability to adapt. Next, we had a panel of experts rate the extent to which each predictor construct would be relevant for predicting performance in the different adaptability dimensions. The results of the expert judgment task suggest two primary implications. First, the different predictor constructs seem to be more or less relevant for forecasting adaptability in each of the eight adaptability dimensions. Second, measures should be designed that facilitate the identification of the type(s) of adaptability required for a given job, so that appropriate predictors can be selected based on the types of adaptability required on the job.

TR 1069 Team Situational Awareness Training in Virtual Environments: Potential Capabilities and Research Issues, Ehrlich, J.A.; Knerr, B.W.; Lampton, D.R.; McDonald, D.P July 1997, (AD A337 606)

Members of small dismounted units face growing responsibilities and challenges in both combined arms combat and in contingency operations. Field training for these diverse missions is limited by cost and environmental factors. Virtual environment (VE) technology offers a potential complement to other training methods to meet the rapidly changing requirements for military training. This report provides an assessment, based on a review of the relevant research literature, of the capability of VE technologies, and strategies for their use, for training members of small dismounted units to acquire and maintain situational awareness. It summarizes the state of the art of research in the areas of situational awareness, team training, VE technology, and instructional strategies for simulation-based training. It identifies current and future challenges for providing situational awareness training to members of small dismounted units and makes recommendations for future research.

TR 1070 Scoring System Improvements to Three Leadership Predictors, Dela Rosa, M. R.; Knapp, D.J.; Katz, B.D.; Payne, S.C. November 1997. (AD A339 243)

leadership effectiveness ratings at each level and did so better than verbal reasoning ability, tacit knowledge for managers, or experience. A complex relationship emerged between tacit leadership knowledge and leadership effectiveness ratings at the three command levels, supporting the use of a multi-level approach in assessing tacit knowledge.

TR 1081 Tacit Knowledge for Military Leadership: Some research products and their applications to leadership, Horvath, J.A., Hedlund, J., Snook, S., Forsythe, G.B. & Sternberg, R.J. May 1998. (AD A344857)

Tacit knowledge is defined as knowledge grounded in experience, intimately related to action, and not well supported by formal training and doctrine. Tacit knowledge of leadership used by Army officers at three different levels of command have been identified, assessed, and developed into assessment inventories for each level. The inventories have been construct validated and proven to predict leadership effectiveness ratings at each level and to do so better than measures of verbal reasoning ability, tacit knowledge for business managers, or experience. This report summarizes the development process and identifies and discusses findings from the development process that have potential application in Army leadership development. The relationship of tacit knowledge to the future of military leadership is also discussed.

TR 1082 Night Vision Goggle Research and Training Issues for Ground Forces: A Literature Review, Dyer, J.L. & Young, K.M. May 1998. (AD A347071)

A review of the night vision goggle (NVG) literature published over a 30-year period was conducted to identify NVG training issues that should be addressed to enhance the performance of ground forces. First-, second-, and third-generation image intensification devices are covered. Although the focus is on ground forces, research that addressed aviation issues is also included. The review documents how soldier performance has improved from advancements in image intensification technology as well as from concerted efforts to address some long-standing training problems. Training research and development issues identified are: determining techniques to train soldiers on NVG technology and its application to night tasks, how to train soldiers to integrate NVGs with other equipment, training to enhance distance estimation abilities of soldiers when using NVGs, and training, to improve mounted and dismounted navigation skills with NVGs. Attention must also be paid to developing training techniques that will enable soldiers to overcome the learning plateaus and human factors problems with NVGs so they become truly skilled at night with NVGS.

TR 1083 Fidelity Analysis for the OH-58D Kiowa Warrior Crew Trainer, Stewart, J.E. II. , Cross, K.D. & Wright, R.H. June 1998. (AD A347271)

The Army must balance cost and training effectiveness in acquiring a Kiowa Warrior Crew Trainer (KWCT). This entails determining the least fidelity required for specific training objectives, employing the least costly technology. A fidelity analysis was conducted which involved (a) analysis of training requirements, (b) review of the literature, and (c) empirical assessment of a benchmark KWCT. Subject matter experts (SMEs) identified 13 tasks for which training in the aircraft alone was inadequate. It was concluded that the KWCT should

train these tasks under the full range of visibility conditions and when affected by obscurants. The literature revealed virtually no data on display resolution required to train tasks other than target detection and identification. It also implied that a visual display system with adequate field-of-view (FOV) and resolution for target detection and identification at realistic standoff ranges would be prohibitively expensive. For the benchmark KWCT assessment, small sample size made performance evaluation difficult. Gunnery was more affected by degraded depth cues when resolution was low (480 lines), than when high (768 lines). Low resolution was perceived as inadequate for all tasks and high resolution as marginally adequate for gunnery. FOV was perceived as less critical to gunnery than to general flying.

TR 1084 An Approach to Evaluating Distance Learning Events, Wisher, R. A. and Cumow, C. K. June1998. (AD A360984)

In accordance with an agreement with the National Guard Bureau (NGB) a simplified evaluation form was developed that assessed demographic, instructional, and technology factors for distance learning training events of short duration. The evaluation form was derived from the good practices identified in the research literature, and was used during the assessment of eight distance learning events given by the NGB nationwide. Based on returns (n= 1,044) the evaluation form proved to be a reliable instrument which demonstrated adequate face validity. Based on these results, a slightly modified form was developed for use by the NGB for all short-term, distance learning events.

TR1085 Canceled.

TR 1086 Self -Assessment Based Mini-After Action Review (SAMAAR) Methodology: Developmental Application to Division Artillery Staff Training, Mirabella, A. and Love, J.F. July 1998. (AD A352838)

This research was conducted as a pilot effort in preparation for anticipated future research applications of the self assessment based mini-AAR (SAMAAR) approach. The approach combines the Army's Socratic based after action review with the Delphi technique. Delphi elicits independent judgments from experts before bringing them together to solve problems as a group. In the SAMAAR approach, trainees, at the end of an exercise day or shift fill out rating forms to assess the units training progress and then convene with their completed forms to participate in a mini-AAR. The mini-AAR is a preliminary training review carried out by small groups prior to an end of exercise after action review. SAMAAR was developmentally applied to Division Artillery Staff training at Fort Hood. The approach was judged by training participants to be a feasible and timely way to support training feedback.

TR 1087 Effect of a Body Model on Performance in a Virtual Environment Search Task, Singer, M. J, Ehrlich, J.A., & Allen, R.C. August 1998. (AD A352206)

The U.S. Army Research Institute is investigating requirements for using Virtual Environments (VE) in training dismounted soldiers. This experiment investigated full-body representation (generic) versus a hand-linked pointer on movement performance in a office

building interior during a search task. The search task was used as a representative dismounted soldier activity in urban environments. The VE used a binocular Head-Mounted-Display (HMD) with head-coupled and body-referenced movement control. Sensors enabled participants to 'walk' through the VE while performing the search task in six repeated trials. Movement time and number of collisions during discrete phases of the search task revealed no significant differences found between full-body and pointer representations, although significant improvement was found over repeated trials. Field of View is discussed as a possible intervening aspect.

TR 1088 Enhancing the Resource Efficiency of Live-Fire Tank Gunnery Evaluation, Smith, M.D. and Hagman, J.D. October 1998. (AD A368641)

This investigation reports the development of a target engagement reduction methodology that supports resource-efficient, live-fire gunnery evaluation on Tank Table VIII (TTVIII), the intermediate-level tank crew gunnery certification exercise. Through a series of multiple regression analyses, it was determined that TTVIII can be reduced from its current 10 engagements to 7 engagements. Scores on these 7 engagements can be used to predict 10-engagement-based TTVIII total scores with greater than 85% predictive accuracy. For Army National Guard (ARNG) units, the 7 engagements can be selected randomly. For Active Component (AC) units, however, the predictive subset must consist of specific engagements. For the ARNG, subsets consisting of as few as two engagements can be used to identify tank crews with little chance of achieving first-run qualification (Q1), and subsets consisting of as few as four engagements can be used to identify crews with a high probability of firing Q1. Both predictions can be made with 95% accuracy. For both the ARNG and AC, short-cut scoring models allowed the prediction of 10-engagement-based TTVIII total scores, based on subsets of any size, with calculational ease. It was concluded that more resource-efficient live-fire tank gunnery evaluation is possible in both the ARNG and AC without sacrificing evaluative validity. The magnitude of resource savings to be anticipated from use of the recommended resource-efficient methods was estimated.

TR 1089 Virtual Environments for Dismounted Soldier Training and Performance: Results, Recommendations, and Issues, Knerr, B.W., Lampton, D.R., Singer, M.J., Witmer, B.G., Goldberg, S.L., Parsons, K.J. and Parsons, J. November 1998. (AD A360109)

The U.S. Army has made a considerable investment in the use of virtual environments (VE) to train combat forces, to evaluate new systems and operational concepts, and to rehearse specific missions. While these simulations have predominately focused on training and simulation for mounted soldiers, there is also a need to train infantry and other dismounted soldiers. Although VEs have the potential to immerse dismounted soldiers directly in simulations, there are few successful examples of the use of VE to provide effective training. The effective use of VE for training requires identification of the types of tasks for which VE training is most appropriate, the characteristics of VE systems that are required to provide effective training, and the training strategies that are most appropriate for use with VE. This report presents recommendations for the use of VE for dismounted soldier training and mission rehearsal, and identifies needed future research. They are based on the results of an ARI in-house research

program, related programs in which ARI scientists have participated, and the work of other VE researchers. Recommendations include types of tasks for which training in VE is and is not appropriate, interface design recommendations, and ways to reduce side- and after-effects.

TR 1090 Problem Solving of Mid-Career Army Officers: Identifying Natural Reasoning, Pounds, J. and Fallesen, J.J. November 1998. (AD A359869)

Military officers face diverse problems on the battlefield, during training, and in garrison. Doctrine specifies stepwise procedures as guidance for problem solving. However, these models are often not appropriate for varying circumstances. Further, other research (Pounds & Fallesen, 1997) demonstrated that these models do not represent methods actually used by tactical leaders. This project focussed on identifying officers' actual problem solving processes. Phase One of this project identified how situational variables affected officers' approaches to problems. Phase Two elaborated on the influence of familiarity on strategy use. Strategy use was also examined related to conflicting tactical goals of force protection and mission accomplishment. Although most participants stated that the strategy of identifying a specific goal was important to their thinking, a content analysis of interview transcripts revealed that the specific goals identified were of very diverse content. Examination of transcripts also revealed a variety of new naturalistic strategies and organizing themes. These were defined and illustrated by examples. Recommendations are made for self-development and personal awareness to leverage existing knowledge to cope with novel situations.

TR 1091 Impact of Information Technology on Battle Command: Lessons from Management Science and Business, Dodge, G.E., Webb, H.W., and Christ, R.E. February 1999. (AD A362144)

The possible effects of information technology insertion on organizations and their personnel are derived from an analysis of published management science and business literature. Two major points are developed. First, many factors other than the technical potential of a given information technology interact with one another and with the technology itself to determine the resultant nature, form, and functionality of the "digitized" organization. Second, the most significant impact on commanders and their staffs for the foreseeable future will not be quantum improvements in operational performance made possible by information technology but, rather, the technology insertion process, itself. Based on this analysis, we propose that implications for command in a digitized environment can be best described by reference to a continuum of organizational structures and associated behaviors. The extremes of this continuum are defined as digital mechanistic and digital organic. A third point between these two extremes is defined as digital adaptive. We discuss the nature of command over the range of the proposed continuum. The new competencies that might be required of commanders and their staffs regardless of the outcome of the technology insertion process are then discussed. The chapter concludes with suggestions for improving the technology insertion process.

TR 1092 Optimizing Simulator-Aircraft Mix for U.S. Army Initial Entry Rotary Wing Training, Stewart II , J. E., Dohme, J.A., and Nullmeyer, R.T. March 1999. (AD A361814)

Early fixed wing research demonstrated that potential cost and training benefits could be derived from simulation-augmented primary flight training. Unfortunately, more recent research in this area has been the exception, not the rule. This is especially true in the case of rotary wing (helicopter) aircrew training research. The present report reviewed the research literature on military aviation transfer of training (TOT) research, and examined the current U.S. Army Initial Entry Rotary Wing (IERW) Program of Instruction. An in-depth review was also conducted on the recent IERW simulation research performed by the Army Research Institute (ARI) Rotary Wing Aviation Research Unit (RWARU). Review of the IERW TOT research showed that a combination of synthetic flight simulation and criterion-based training had the potential for saving training time and costs in the aircraft. Adaptive training aids such as the ARI RWARU Intelligent Flight Trainer, also showed promise. A research program, focusing on revising the current IERW program to optimize the use of simulation, was proposed. This program would include (a) criterion-based instructional strategies, (b) low-cost simulation, and (c) investigation of different combinations of simulator vs. aircraft training events, in order to determine the optimal simulator/aircraft training "mix."

TR 1093 Tacit Knowledge in the Workplace, Sternberg, R.J., Forsythe, G.B., Hedlund,J., Horvath, J.A.,Tremble,T.,Snook, S., Williams, W.M., Wagner, R.K., Grigorenko, E.L. March 1999. (AD A362656)

This is the final product of a six-year effort to define, assess and measure tacit knowledge for leadership among U.S. Army officers. Tacit knowledge is defined as knowledge grounded in experience, intimately related to action, and not well supported by formal training and doctrine. Tacit knowledge for leadership was researched at three different levels of command and developed into assessment inventories for each level. The assessment inventories have been construct validated and proven to predict certain leadership effectiveness ratings at each level and to do so better than measures of verbal reasoning ability, tacit knowledge for business managers, or experience. The report describes the constructs of "practical intelligence" and "tacit knowledge", other research related to them, the general methods used in assessing tacit knowledge, and the development of the Tacit Knowledge for Military Leaders inventories. There is also a chapter on the practical implications for leadership development and training. An expanded version of this report will appear as a commercially available book entitled, Practical Intelligence in Everyday Life by the same authors.

TR 1094 Prescreening Methods for Special Forces Assessment and Selection, Zazanis, M.M., Hazlett, G.A, Kilcullen, R.N. & Sanders, M.G. May 1999. (AD A365003)

The Special Operations Proponency Office (SOPO) at the U.S. Army John F. Kennedy Special Warfare Center and School requested help from the U.S. Army Special Operations Command Psychological Application Directorate and the U.S. Army Research Institute in identifying prescreening tools to determine which soldiers would have the greatest chance of success in the Special Forces (SF) selection and training pipeline. Two studies were completed examining different methods for predicting performance in SF selection and training. Analyses focused on junior level enlisted soldiers, who have lower success rates than the non-commissioned officers. Results indicated that Army Physical Fitness Test, previous branch type, Armed Services Vocational Aptitude Battery General Technical score, and airborne qualification

provided optimal prediction of success in SF Assessment and Selection (SFAS). Soldiers in the highest prediction category achieved a select rate of 66%; whereas, soldiers in the lowest prediction category showed a success rate of only 24%. Two methods were proposed to generate order of merit lists that would identify recruits with the highest potential for success in SFAS. This would allow SOPO to minimize recruitment of soldiers who have little chance of completing SFAS.

TR 1095 Training Through Distance Learning: An Assessment of Research Findings, Wisher, R.A., Champagne, M.V., Pawluk, J.L., Eaton, A., Thornton, D.M. & Curnow, C.K. August 1999. (AD A368592)

This report offers a review of the literature on the effectiveness of distance learning as applied to training. Most research in distance learning was found to be anecdotal, focusing on education rather than training. When effectiveness was measured, it was usually not supported by strong experimental or quasi-experimental designs, and comparative results (such as to the classroom) were reported only one-third of the time. When data were reported, there were analytic problems and errors in reporting which were often overlooked by researchers. An assessment of the completeness of information in reporting course design and instructional techniques in the literature showed 40% of the studies did not mention course design or conversion and 25% did not mention instructional techniques. When distance learning was demonstrated to be effective, it was difficult to resolve why it was effective: the effort in course design or reconversion, the instructional techniques used, or the methods of communication (technology) employed. Suggestions for improving evaluations are offered.

TR 1096 Digital Procedural Skill Retention For Selected M1A2 Tank Inter-Vehicular Information System (IVIS) Tasks, Sanders, W.R. August 1999. (AD A368212)

The U.S. Army Force XXI program makes extensive use of digital communications technologies to speed the exchange of information among all operational levels. While digital communications offers great potential, anecdotal reports from field trials and testing repeatedly state that the basic procedural skills needed to operate these systems are highly perishable. The present research developed estimates of digital procedural skill retention for the tasks of creating and sending digital map overlays and reports, using the M1A2 Abrams tank Inter-Vehicular Information System. Twenty-eight soldiers received instruction based on the M1A2 New Equipment Training Team lesson plan, followed by an immediate evaluation of task performance, and a follow-on evaluation 30 days later. Results showed a 52 percent reduction in the number of soldiers able to create and send digital map overlays after the 30 day delay, and a 23 percent reduction in the number able to create and send digital reports. Methods for measuring skill decay are presented, and an approach to identify performance errors is provided.

TR 1097 Applying Digital Technologies to Training: A Focus on Pictorial Communication, Lickteig, C.W. and Throne, M.H. September 1999. (AD A369262)

Digital technologies can help solve many of the training problems they create. The Army's investment in digital technologies assumes that they will portray a common picture of

the battlefield on the digital displays of warfighters and supporters, and improve training. This report focuses on the application of digital technologies, such as instrumented command and control systems and military simulation, to train the skills to understand and maintain a pictorial depiction of the battlefield situation on digital displays. Three main areas of research are identified that focus on common picture training and evaluation requirements: define, communicate, and maintain a common picture of the battlefield. For each of these areas, research issues are raised and corresponding training and evaluation methods are recommended to address each issue. Overall, the method recommendations repeatedly examine how a log of soldier-computer interactions from instrumented command and control systems can automatically provide an empirical base for assessing performance and giving feedback. Conclusions consider how integration and implementation of the training and research methods recommended in this report, in concert with digital technologies, might foster design and development of a digital training environment directed at the pictorial communication of battlefield situations on digital displays.

Research Reports

RR 1667 Reacquisition of skills by combat engineers mobilized from the individual ready reserve, Kern, R.P.; Wisher, R.A.; Sabol, M.A.; Farr, B.J. October 1994. (AD A286 244)

For this report, skill reacquisition data were collected during a mobilization training exercise on 76 individual ready reserve (IRR) soldiers (combat engineers) who had been separated from active duty for periods ranging up to 10 years. Military occupational knowledge was measured before and after a 5-day rapid train-up and hands-on performance for 18 MOS tasks was recorded. Increases in task knowledge were strongly related to prior active duty status (full tour vs. initial entry training only) and Armed Forces Qualification Test (AFQT) scores (above vs. below the 50th percentile). Time since separation from active duty did not have a systematic effect. Although these findings cannot be generalized beyond the procedural-type skills examined, the results are evidence for a need to reconsider the current IRR mobilization guideline based solely on separation time. These findings suggest that active duty status, AFQT scores, and a separation window as long as 36 months can serve as determinants of potential for rapid reacquisition of critical skills during a mobilization.

RR 1668 Measuring mass and speed at the National Training Center, Goehring, D.J.; Sulzen, R.H. October 1994. (AD A286 282)

In this report, a method is proposed and tested for measuring the massing of ground forces in force-on-force simulated combat. The relationship of the mass as well as the speed of an attacking force to attrition-based performance is explored. The researchers used archival data generated at the National Training Center, Fort Irwin, California. Successful attacking task forces, were found to have had greater massing and to have closed with the opposing force at higher speed. The methodology developed demonstrates the high potential for using existing data from the National Training Center for theoretical research with practical training implications.

RR 1669 Performance analysis of table VIII tank gunnery engagements, Hagman, J.D. October 1994. (AD A286 186)

To assess performance on individual Table VIII gunnery engagements, the first-run scores of 109 tank crews from three U.S. Army National Guard (ARNG) armor battalions were averaged and then ordinally ranked for difficulty. For all three battalions, three of the four engagements found to have the lowest average scores (highest difficulty rankings) required machine gun (coax or caliber .50) employment either alone or in combination with the main gun. In the remaining engagement of this foursome, crews were required to fire at multiple targets with the main gun using the gunner's auxiliary sight. Two of the three engagements found to have the highest average scores (lowest difficulty rankings) involved presentation of only a single target. These results can be used by ARNG armor trainers to help maximize the payoff from their training time investment by focusing on the engagements found to be the most difficult, thereby enhancing the probability of first-run crew qualification on Table VIII.

RR 1670 Peace operations: Workshop proceedings, Segal, David R. October 1994. (AD A292 116)

Conceptualization of changes in peace operations, and the experience of Americans and allied military forces in such operations, were the focus of a 1993 U.S. Army Research Institute for the Behavioral and Social Sciences workshop. The purpose of this workshop was to identify what we know and what we still need to learn about how to screen, select, and train soldiers, units, and leaders for increasing American Participation in operations other than war, Particularly in a multinational context. Experiences considered ranged from the Multinational Force and Observers in the Sinai to Operation Restore Hope in Somalia.

RR 1671 A simulation-based evaluation of a force protection system: Soldier performance, training requirements, and soldier-machine interface considerations, Elliott, G.S.; Wong, D.T.; Dreby, C.A.; Jarboe, J.E. February 1995. (AD A292 806)

This soldier-in-the-loop evaluation, part of Tank Automotive Research, Development, and Engineering Center's (TARDEC's) ongoing hit-avoidance research effort, used a simulated prototype Vehicle Integrated Defense System (VIDS) as its conceptual protection system. VIDS is composed of a system of sensors and countermeasures and a counterfire system regulated by an artificial intelligence module to assist the operator to defend the vehicle. Platoon command survivability and lethality while using the M1 tank with and without VIDS was examined. Research objectives were to (a) determine if VIDS enhanced platoon combat operational effectiveness, (b) determine the optimal VIDS configuration, (c) identify future training requirements and soldier-machine interface issues, and (d) identify impacts on tactics, techniques, and procedures. Findings indicated VIDS-equipped platoons survived significantly better and progressive additions of sensors and countermeasures enhanced platoon survivability. The effects of VIDS on lethality performance was negligible.

RR 1672 Planning in the Special Forces operational detachment alpha, Morrison, J.E.; Smith, D.H.; Sticha, P.J.; Brooks, J.E. February 1995. (AD A292 723)

The objectives of this study were to identify individual and collective processes that characterize both effective and ineffective planning in the Special Forces (SF) Operational Detachment Alpha (ODA) and to suggest training enhancements. During Phase I, interviews with SF experts indicated that ODA commanders and their staffs are deficient in skills and knowledges related to mission analysis and intelligence preparation of the battlefield (IPB). During Phase II, the authors reviewed archival data and observed ODA planning during a single rotation at the Joint Readiness Training Center (JRTC). ODAs that were "strong" in mission analysis (a) generated more effective implied tasks resulting from analysis and relating to other mission elements; (b) recognized a wider variety of constraints and were more likely to include constraints directly related to the threat; and (c) were more likely to revise courses of action (COAS) or method of evaluation based on the results of their evaluation. ODAs that were 'weak' in IPB (a) did not analyze the effects of weather and terrain on their mission, (b) did not develop an appropriate reconnaissance and surveillance (R&S) data collection plan, (c) may produce lower quality IPB products, and (d) may determine enemy COAs less effectively.

RR 1673 Computer-supported simulation at the National Fire Academy: Lessons learned for incident command training, Mirabella, A.; Macpherson, D. April 1995. (AD A295 789)

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and the National Fire Academy (NFA) are pursuing a joint effort to transfer training and training development technology from the U.S. Army to the Federal Emergency Management Agency (FEMA). The goal of the effort is to enhance emergency management training through computer-supported simulation. The Army's research on simulation-based unit training and tactical decision making can benefit NFA. This report summarizes results of an initial effort to transfer Army experience to the Academy. The report describes NFA simulation methodology as a baseline from which future upgrades will be made and recommends ways to introduce computer-aiding to support management of simulation exercises and performance assessment. The recommendations address the near-term goal of introducing computer-supported simulations at the NFA campus and the long-range goal of distributing simulation nationwide.

RR 1674 Effect of crew composition on AH-64 attack helicopter mission performance and flight safety, Grubb, G.N.; Simon, R.A.; Leedom, D.K; Zeller, J.L. April 1995. (AD A294 051)

This report evaluates battle rostering (pairing crew members on a long-term basis) by comparing AH-64 attack helicopter crews when flying in battle-rostered and mixed crew compositions. Participants in the experiments were AH-64 attack helicopter standardization instructor pilots and 12 battle-rostered aircrews consisting of a pilot and a copilot gunner. All participants received training in the Army's Aircrew Coordination Exportable Training Package as a prerequisite for the experiment. Participating aviators conducted two missions in a battle-rostered crew and two missions in a mixed-crew. Discussion and analysis of crew performance are pres6nied as measures of behavior, task performance, mission performance, and participant exit interview comments. The experiment concluded that minimal evidence exists to show that battle rostering provides meaningful improvements in the mission performance or flight safety of crew coordination-trained aircrews. Battle rostering drawbacks include overconfidence and increased reliance on Implicit communication and coordination. The report recommends implementing actions to improve mission effectiveness and flight safety and follow-on research to better understand and capitalize of the strengths of crew and team coordination.

RR 1675 Developing the reserve component virtual training program: History and lessons learned, Hoffman, R.G.; Graves, C.R.; Koger, M.E.; Flynn, M.R.; Sever, R.S. April 1995. (AD A296 153)

This report describes the development of the Reserve Component Virtual Training Program (RCVTP) for training U.S. Army National Guard (ARNG) armor units using the simulation technologies of Simulation Networking (SIMNET), Janus, and an automated tactical operations center simulator called the Commander/Staff Trainer (C/ST). The report presents the project's background, including the conceptualization of the RCVTP by the contracting agency, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), and the contractor team's proposal for operationalizing ARI's conceptualizations. Three of the major

goals of the RCVTP are to emphasize execution, to compress training time, and to reduce training management by providing a turn-key program for the ARNG. The report summarizes the design and development of the RCVTP's platoon-, company-, and battalion-level exercises and their training management materials. Significant design issues discussed include identifying tasks appropriate for training in designated simulated environments and incorporating specified design concepts through the process of outlining the training exercises. The development of the exercises and the training management materials is discussed in light of their relationship to the design principles and in terms of their relevance to the final RCVTP product. The report describes the formative evaluation and presents findings in the context of the developmental framework. Finally, the report documents the process of extending the developmental methodology through the creation of cavalry troop exercises and identifies lessons learned.

RR 1676 An automated system for the analysis of combat training center information: Strategy and development, Goehring, D.J. May 1995. (AD A297 143)

This report explains the rationale for and development of automated systems for the analysis of Combat Training Center archive information. Such systems are justified in terms of need, reuse, and technological advances in computer hardware and software. The Automated Force Concentration Measurement System, which serves as an example of a successfully developed system, illustrates the advantages of the approach using data from National Training Center simulated combat field training exercises. The system efficiently replicates earlier research findings regarding the massing of attacking forces.

RR 1677 Sinai task leaders at the infantry leaders course, Salter, M.S.; Fober, G.W.; Pleban, R.J.; Valentine, R.J. June 1995. (AD A304 231)

The senior leaders of the 4-505 Parachute Infantry Regiment (PIR) Multinational Force and Observers (MFO) Sinai Task Force deployed from Fort Bragg, NC, to Fort Benning, GA, from August 26, 1994 through September 23, 1994, to attend the Infantry Leaders Course (ILC). The 4-505 is a composite or "experimental" battalion, both in its composition and in its availability to accomplish the MFO Sinai peacekeeping mission. In leadership positions, half are Regular Army, the other half National Guard or Army Reserve. The ILC, specializing in Infantry doctrine and tactics and collective Infantry skills, was the initial training event for 154 leaders of the newly constituted battalion and their first opportunity to function as a group. Data were collected through written questionnaires, interviews, and first-hand training observations. Research questions focused on training and within unit bonding. Observations confirmed that the composite battalion would be able to conduct its mission; the leaders were trained. Those with skill deficiencies were highly motivated and benefited most. Early concerns over unit cohesion focused on the Active/Reserve mixture and whether the two elements could be combined and work together. Concerns proved unfounded, as the members of the units readily accepted each other as members of the common MFO unit.

RR 1678 Shooting with night vision goggles and aiming lights, Dyer, J.L.; Smith, S.; McClure, N.R. June 1995. (AD A297 284)

Aiming lights, zeroed to the M16 rifle and used with night vision goggles (NVGs), provide soldiers an enhanced night firing capability. However, aiming lights are difficult to zero. Firers have difficulty in getting initial shot groups on the 25-m zero target, from which aiming light adjustments must be made, and in aiming consistently during live-fire zeroing, because of the bloom Of the aiming light and reduced visual acuity through NVGS. Research addressing both problems was conducted. Modifications to the 25-m live-fire zero procedures resulted in smaller shot groups, enabled firers to zero with fewer shot groups, and yielded higher hit performance compared to current zeroing procedures. Good NVG acuity settings resulted in smaller shot groups and in higher hit performance than poor settings. A dry-fire zero procedure increased the likelihood of getting initial shot groups on paper, compared to the manufacturer's mechanical adjustment, and could substitute for live-fire zeroing in emergency deployment situations. The revised procedures use readily available materials and apply to AN/PAQ-4A and AN/PAQ-4B aiming lights.

RR 1679 An initial evaluation of a simulation-based training program for Army National Guard units, Shlechter, T.M.; Bessemer, D.W.; Nesselroade, K.P.; Anthony, J. June 1995. (AD A297 271)

This research effort was designed to provide initial empirical information needed to examine the Reserve Component Virtual Training Program's (RCVTP's) instructional effectiveness. A multimethod-multisource research strategy was used to address this objective. Observers collected data from 9 units, who executed 45 tables (exercises); 14 RCVTP instructors completed standard rating forms regarding the performance of 38 armored force units; and 280 training participants completed Likert-scale items regarding their training experience. Data from the different methods indicated that the units further developed their collective tactical skills across the training period. They took significantly less time, made fewer errors, and needed less coaching as their training progressed. The instructors indicated that most units had a greater likelihood of becoming more proficient in critical subtasks than either not improving or becoming less proficient. The participants claimed that they were more proficient after training than before. The RCVTP should continue to be used to train Army National Guard armored units.

RR 1680 Helicopter simulator sickness: A state-of-the-art review of its incidence, causes, and treatment, Wright, R.H. June 1995. (AD A297 285)

For this report, helicopter simulator sickness literature was reviewed and analyzed to estimate the scope of the problem in the Army. The author concluded that pilot reluctance to divulge symptoms, in combination with the survey methods used, leads to underestimation of the incidence and seventy of symptoms. Lack of truly anonymous survey procedures and potential adverse flying career consequences are suggested as reasons that the more severe symptoms and aftereffects may not be reported in surveys. Potential adverse career impact is also suggested as a probable reason for failure to find any relationship between simulator sickness aftereffects and accidents or safety incidents. Guidelines are suggested for minimizing the development of simulator sickness and the safety consequences of its aftereffects.

RR 1681 A comparison of two alternative velocity vector cue combinations for the AH-64D integrated helmet and display sight subsystems, Stewart, J.E. II. June 1995. (AD A298 320)

The AH-64A employs an integrated helmet and display sight subsystem which presents night vision system and flight data to the pilot's right eye. Velocity vector and acceleration cues tell the pilot when the aircraft is accelerating, its speed, and vector. A 6 kt cue is used for hovering; a 60 kt cue for transition. A single 20 kt cue was proposed for the AH-64D. The requirement was dropped, but the question remained as to whether the 20 kt cue provided any advantage. The experiment was conducted to answer this question. Ten AH-64A pilots performed a mission consisting of seven Aircrew Training Manual (ATM) tasks, under 1-day and 2-night conditions (6/60 kt and 20/60 kt cues) in the simulator training research advanced testbed for aviation (STRATA). The STRATA copilot-gunner station was used with a rear-projection display. Of 210 task events, 209 met ATM standards. Performance across all tasks was better in the 6/60 than in the 20/60 condition ($p<.04$, two-tailed). Performance on stationary hover reached significance ($p<.05$) and approached significance for "three other hovering tasks. Results supported retention of the 6 and 60 kt cues.

RR 1682 Canceled

RR 1683 Intercultural communication requirements for Special Forces teams, Russell, T.L.; Crafts, J.L.; Brooks, J.E. July 1995. (AD A298 798)

Communicating effectively with individuals from different cultures is essential for Special Forces (SF) teams. SF soldiers must possess language skills, interpersonal skills, cultural knowledge, as well as nonverbal skills, to do their job of conveying technical skins and knowledge to indigenous troops, negotiating resources and plans, and developing positive regard for the United States and SF. The goal of this project was to identify critical performance dimensions relevant to intercultural communication for SF and appropriate intercultural training topics. The approach involved reviewing the published literature, analyzing existing critical incident data, and tying intercultural communication performance categories to the content of current training courses. The analyses resulted in a set of eight intercultural communication performance categories for SF. The categories vary in the level of intercultural skill requirements-from basic awareness, to knowledge of the specific culture, to application of intercultural skills. The findings include specific suggestions for enhancing the training SF soldiers receive in intercultural communication.

RR 1684 An investigation of simulator sickness in a tank driver trainer, Lampton, D.R.; Kraemer, R.E.; Kolasinski, E.M.; Knerr, B.W. October 1995. (AD A304 277)

The Montgomery G.I. Bill (MGIB) and the Army College Fund (ACF) are important enlistment incentives to induce high quality individuals to enlist in the Army. This report examines differences in participation and usage behavior of individuals in these programs. Descriptions of the MGIIB and the ACF programs are provided. Tabulations present indications of differences by gender, race, entering educational level, and marital status for

program participants and benefit users. The report also includes a description of who uses their benefits, when and where they are used, and how much is used. Regression analyses of the amount of benefit used for a sample of veterans who enlisted in Fiscal Year 1986 test whether or not there are differences in usage behavior for demographic factors, educational level at entry into the Army, and Armed Forces Qualification Test categories.

RR 1685 Overview of practical thinking instruction for battle command, Fallesen, J.J. November 1995. (AD A309 755)

The U.S. Army Research Institute for the Behavioral and Social Sciences developed instruction on thinking, reasoning, and decision malting at the request of the Training and Doctrine Command and the Command and General Staff School. The instruction went beyond current educational and training practices. Practical thinking refers to the cognitive skills that are used in creative and critical thinking. Emerging cognitive theories that emphasize how people naturally make decisions served as the basis for identifying the desired skills. The lessons that were developed addressed how attitudes influence thinking, techniques for taking different Perspectives, how to speculate about assumptions, practical guidelines for reasoning, and how to form encompassing views. The lessons were included as part of a course on Battle Command. Seventy-three students participated in 12 hours of classes. At the end of the course a sample of them reported an increase in their expertise in all six of the lessons. The notable accomplishment was the application of a cognitive approach to job-specific material for battle command and the experimental Mobile Strike Force. Five directions are suggested for further exploration of the concepts.

RR 1686 Using virtual environments for terrain familiarization: Validation, Johnson, D.M.; Wightman, D.C. November 1995. (AD A304 416)

Can virtual environment (VE) technology be used to familiarize soldiers with a geospecific location that they have never previously visited: This question was asked in a training validation experiment employing a two-group, preset-posttest design. The results support the proposition that VE technology can be used for terrain familiarization training.

RR 1687 How to support families during overseas deployments: A sourcebook for Service providers, Bell, D.B.; Stevens, M.L.; Segal, M.W. January 1996. (AD A304 281)

The purpose of this report is to review what is known about family Support that can be applied to future Army deployments, The review is restricted to units of at least 150 service members deployed for at least one 6-month period since 1980.

RR 1688 An examination of the value of demonstration tapes for the virtual training program, Shlechter, T.M.; Anthony, J. April 1996. (AD A306 718)

This report discusses the instructional value of the demonstration tapes associated with the Virtual Training Program (VTP) at Fort Knox, KY. This examination consists of reviewing research on demonstration materials and examining VTP participants use of and opinions

regarding these tapes. Findings from the observational learning literature and the assessments indicated that the demonstration materials would augment the VTP's training value. The literature review revealed that observational learning techniques can help the VTP participants develop their self-regulatory skills and sense of self-efficacy. The participants also felt that these tapes were useful, especially for familiarizing them with the learning situation.

RR 1689 Simulation-based mounted brigade training (SIMBART) program: History and lessons learned, Koger, M.E.; Long, D.L.; Sanders, J.J.; Broadwater, T.W; Brewer, J.D.; Britt, D.B. May 1996. (AD A309 752)

The U.S. Army Research Institute for the Behavioral and Social Sciences, in coordination with the Advanced Research Projects Agency and the National Guard Bureau, has sponsored the development of the Virtual Training Program. The Simulation-Based Mounted Brigade Training (SIMBART) program incorporates the methodology and lessons learned from developing simulation-based exercises for platoon-, company-, battalion-, and battalion staff-level training and applies them to developing structured simulation-based brigade staff training exercises. This report provides the history and lessons learned for the SIMBART effort.

RR 1690 Canceled.

RR 1691 Perspectives on the virtual training program from members of its initial observer/controller team, Shlechter, T.M.; Kraemer, R.E.; Bessemer, D.W.; Burnside, B.L.; Anthony, J. August 1996. (AD A310 080)

This report examined the Virtual Training Programs (VTP) strengths and weaknesses from the perspective of its original instructional team. These instructional personnel completed questionnaires and were interviewed regarding their opinions on various aspects of the VTP Findings from the questionnaires and interviews provided further support for the VTP's instructional value. The participants indicated that unit leaders and units became more proficient during the course of their VTP rotation, and that this improvement was not simply a function of adapting to the Simulation Networking (SIMNET) terrain and equipment. Correspondingly, the participants had few problems with most aspects of the VTP.

RR 1692 Night vision goggle field-expedient visual acuity adjustment procedures: Initial experiment, Dyer, J. L.; Young, K. M.; Watson, S. A.; McClure, N. R. August 1996. (AD A310 099)

The third generation image intensification technology in night vision goggles (NVGs) used by ground forces provides, at best, 20/40 or 20/45 visual acuity. These acuity levels cannot be achieved unless soldiers adjust their NVGs properly. Documentation available to soldiers does not address optimum adjustment techniques developed by the aviation community nor does it address what can be used in the field to achieve a good setting. We examined the effectiveness and utility of 15 different objects commonly available to soldiers to determine which provided the best visual acuity readings with the AN/PVS-7B NVGs. After training and practice, acuity improved by 25% over the baseline assessment. No large differences in readings

occurred among the objects. However, a more definitive picture emerged when the average readings were combined with measures of variability and soldier preferences. The initial recommendation is to use one of the following objects for NVG adjustment: tree trunk, vehicle, vehicle trail, stars, blue chem light, or an infrared chem light. Not recommended are bright and/or red light sources, white paper, and trees silhouetted against the night sky. Problems in assessing acuity with NVGs are also discussed.

RR 1693 Characterization of sleep, mood, and performance patterns in battalion staff members at the Joint Readiness Training Center, Pleban, R.J.; Mason, T L. August 1996. (AD A310269)

This research tracked the sleep/work patterns of 10 members of a battalion staff during a low-intensity conflict scenario. Sleep patterns were captured by wrist-worn activity monitors that permitted minute-by-minute assessment of the activity levels of each staff member. Staff members were monitored over a 16-day rotation. Data on sleep habits and perceptions of work load levels were collected using paper-and-pencil questionnaires. Daily estimates of cognitive work capacity were obtained using a computerized synthetic work task. In addition, a brief computerized sleepiness-mood scale was presented each day. Staff members slept, on the average, 5.2 hours (range 3.5-6.4 hours) per day. The staff averaged almost 3 hours less sleep per day on rotation than what they indicated they needed for total recovery (8.1 hours sleep per day). Certain staff positions (XO, S2, and S3-Plans) received very little sleep across the rotation (3.7-4.6 hours sleep per day). Over 60 percent of the sleep obtained was fragmented in nature (sleep periods of 10 minutes or less). Substantial increases in response variability were noted for one staff member This preliminary research, together with observations from the combat training centers, suggests that to effectively sustain staff performance during continuous operations, better utilization of staff resources is critical. In addition, commanders must take an active role in the development of unit sleep/work management plans. This includes educating unit members on the importance of sleep in combat operations and how to optimize the recuperative value of available sleep periods through specifically tailored unit sleep plans.

RR 1694 A strategy for efficient device-based tank gunnery training in the Army National Guard, Hagman, J. D.; Morrison, J. E. June 1996. (AD A316 887)

A strategy is proposed for minimizing the device-based training time required to prepare armor crews of the U.S. Army National Guard for on-tank training and live-fire gunnery qualification. Using two devices (i.e., the Conduct-of-Fire Trainer (COFT) and Abrams Full-Crew Interactive Simulation Trainer (AFIST), efficiency is achieved by training only gunnery engagements subjected to later live-fire evaluation, focusing on those engagements not performed to standard, and allocating training time to crews that need it most, as determined through pretesting. Guidance is provided to support strategy implementation at the company level and the conduct of research needed for future strategy refinement.

RR 1695 Training in a digitized battalion task force: lessons learned and implications for future training, Elliott, G. S.; Sanders, W R.; Quinkert, K A. August 1996. (AD A313 293)

The Mounted Battlespace Battle Lab conducted the Advanced Warfighting Experiment Focused Dispatch in 1995 to examine the impact of the integration of digital systems on a Battalion Task Force organization, doctrine, and warfighting capabilities. This report augments the Focused Dispatch efforts and provides information that pertains to unit training with digital systems. The objectives of this research were to: (1) document the units training efforts, (2) capture the lessons learned, and 3) identify implications for future Force XXI training efforts. Data were collected using structured observations, surveys, and interviews. Lessons learned and implications identified were in nine key areas: training strategy, training management, training methods, prerequisite skills and knowledge, digital learning centers, simulation training, training literature, training assessment, and training support.

RR 1696 The human dimensions of battle command: A behavioral science perspective on the art of battle command, Halpin, S. M. August 1996. (AD A315 898)

In response to a request from GEN Frederick E Franks, Jr., Commander of the US. Army Training and Doctrine Command (TRADOC), the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) has undertaken a research initiative addressing the art of Battle Command. This paper represents a first step. Here we examine what and how the behavioral science community can now contribute to improving effective Battle Command, what knowledge gaps we need to fill, and what future research requirements we anticipate based on our understanding of the likely impact of technology and the Army's changing role and missions.

RR 1697 Brigade battle staff training system, Andre, C. R.; Salter, M. S. August 1996. (AD A316 710)

This report documents development of the Brigade Battle Staff Training System (BDE-BSTS). BDE-BSTS, a set of functional area training packages for brigade-level staff officers, is a combination of text and computer-based instruction (CBI). Sponsored by the Advanced Research Projects Agency (ARPA), the BDE-BSTS was developed for use by the US. Army National Guard (ARNG). The prototype BSTS comprised 13 courses for training brigade staff officers in individual functional areas and those tasks required to prepare staffs for collective battle staff tasks. The BSTS program, sponsored under the ARPA program umbrella of Simulation in Training for Advanced Readiness (SIMITAR), is coordinated with three other programs: Simulation-Based Mounted Brigade Training Program (SIMBART), Simulation-Based Multiechelon Training for Armor Units (SIMUTA) and Combat Service Support (CSS) Training System Development for the National Guard.

RR 1698 Impact of a battalion-level peacekeeping mission on the sponsoring Army National Guard Division, Smith, M. D. August 1996. (AD A319 743)

This report assesses the impact upon the 29th Infantry Division (Light) of participating in a Multinational Force and Observers (MFO) peacekeeping (PK) mission in the Sinai Desert. Senior leaders from the nine maneuver battalions that contributed approximately 90% of the divisions PK mission volunteers were surveyed (twice) and interviewed (once) to determine

what training and personnel impacts their units had experienced. A stratified random sample of junior leaders/soldiers from these units was also surveyed, along with active Army readiness advisors to these units,. and soldiers who had volunteered initially for the mission but later withdrew. Senior leaders reported that the Opportunity to participate in the PK mission produced a psychological boost for the soldiers in their units. The mission inspired renewed pride in their units and pride in the Army National Guard as an entity capable of malting significant 'real-world' contributions to world peace. Future participation in similar missions was endorsed by all group surveyed. Positive impacts on morale and family support were reported. Senior leader reports of training impact were initially negative, grew increasingly positive during the course of the mission, and were found to be decidedly positive after mission volunteers were reassigned to their units. Combat readiness was the only area where negative impacts were reported throughout the duration of the PK mission. The return of mission volunteers, however, caused more than offsetting positive impacts in this area. Impacts on both training and combat readiness appeared to be mediated by extent of troop loss. Senior leaders who gave negative impact ratings experienced relatively large percentage troop losses to the PK mission. Finally, soldiers registered dissatisfaction with how recruitment for the PK mission was conducted. Complaints focused on inadequate prior notice, insufficient information upon which to base a decision to volunteer or not, and lack of timely feedback on the selection process and outcome.

RR 1699 Evaluation of a realistic job preview for U.S. Army Special Forces, Brooks, J. E.; Evans, W E. August 1996. (AD A317 214)

This report documents research to evaluate a realistic job preview (RJP) booklet for soldiers and families interested in US. Army Special Forces (SF). The RJP provides accurate, detailed information about important aspects of SF jobs. Recruiters began distributing it in 1994 to potential recruits to encourage informed decisions about joining SF and to help prepare those who volunteer. The evaluation objectives were to: (1) assess and describe booklet implementation, (2) assess the impact on recruits, commitment to joining SF, and (3) document ideas for improvement. We collected survey data from recruiters and from new recruits before and after booklet fielding. The data showed that soldiers who received and read the RJP booklet tended to be located at posts with a strong SF presence and tended to be relatively knowledgeable about SF. The selective nature of our sample of booklet readers made interpretation of the evaluation data difficult. However, the RJP appeared to provide new and important information that was often used in the decision process. Wives in particular seem to have benefited from the information. Recruiters and soldiers reacted favorably overall. The findings supported continuation of the booklet with modifications such as additional detail on Family Support Groups and deployments, and minor formatting changes.

RR 1700 Canceled.

RR 1701 Relationships between platoon gunnery and live-fire performance, Sterling, B.S. September 1996. (AD A319 342)

Reduced training resources require the military to increasingly depend on simulators for routine training. Regardless of how inexpensive a simulator may be, however, the simulator is

useless if it does not enhance performance on the actual equipment. This research demonstrates a relationship between training on platoon gunnery simulators and live-fire gunnery performance for U.S. Army tank and Bradley Fighting Vehicle (BFV) platoons. Because these data replicated previous findings for both simulators, results suggest that both tank and BFV platoons may profit from training on platoon gunnery simulators.

RR 1702 Standardizing Army After Action Review Systems, Meliza, L. L. October 1996. (AD A322 044)

The After Action Review (AAR) is the Army's approach for providing feedback to units after collective training exercises. AAR systems should support the goals of analyzing what happened during an exercise, deciding why it happened, and identifying potential corrective actions. In an effort to reduce duplication of efforts, the Army is developing a Standardized Army AAR System (STAARS) for application across the live, virtual, and constructive environments. This report presents lessons learned about the AAR process, operational AAR systems, and prototype AAR systems that provide input for specifying STAARS capabilities or identify technical or behavioral issues to be addressed by research and development.

RR 1703 An Expansion of the Virtual Training Program: History and Lessons Learned, Groves, C.R.; Myers, W.E. January 1997. (AD A328 416)

This report describes the "Simulation-Based Multiechelon Training Program for Armor Units - Battalion Exercise Expansion (SIMUTA-B)" Project, a follow-on to the "Simulation-Based Multiechelon Training Program for Armor Units (SIMUTA)" Project. The purposes of the project were to: (a) implement and validate the structured simulation-based training development methodology derived during the SIMUTA Project, (b) expand the U.S. Army Armor Center's Virtual Training Program (VTP) exercise library, and (c) revise portions of the VTP's original training support package. The report first describes the VTP initiative and identifies the SIMUTA-B Project objectives. It then describes the project's design phase, formative evaluation effort, and development phase. The design phase section covers the processes of identifying training objectives and composing the mission scenario. The formative evaluation section identifies the evaluation strategy and methodology, and the product testing schedule. The development section provides highlights of development activities and accomplishments. The final section presents lessons learned for use in future development efforts.

RR 1704 Small Team Portal into the2lst Century--SP21, Salter, M.S.; Knerr, B.W.; Lampton, D.R.; Fober, G.W.; Dressel, J.D. December 1996. (AD A323 581)

Behavioral scientists from the U.S. Army Research Institute for the Behavioral and Social Sciences assisted the Institute for Defense Analyses (IDA) Simulation Center in conduct of excursions into the virtual 21st Century battlefield. The 1996 Defense Science Board (DSB) Summer Study requested analytical insights about concepts and technologies being considered for small team operations on the DSB's conceptual 21st Century Battlefield. The DSB focused on the concept of using technology to enable small, rapidly deployable forces to accomplish

missions previously only available to larger forces. Exercises were conducted in a virtual simulation environment. U.S. Army and Marine Corps personnel used specially designed devices in a virtual simulation facility to test concepts about the capabilities of small (3- to 12-man) teams operating in a sensor-rich environment. In addition to computer reported data, behavioral and tactical observers documented man-in-the-loop soldier performance and interactions with specific equipment. Combat effectiveness was enhanced through sophisticated communication devices and computers. Personnel were able in the virtual environment to perform tasks similar to those that might occur in a future battlefield scenario. A benefit of the simulation was the ability to portray future missions with prototype equipment.

RR 1705 Training for Operations Other Than War (Stability Operations): Front End Analysis, Salter, M.S. December 1996. (AD A323 247)

This report is a research byproduct that documents the Front End Analysis for development of the Brigade-Battle Staff Training System (BDE-BSTS). BDE-BSTS, a set of functional area training packages for brigade-level staff officers, is a combination of text and computer-based instruction (CBI). Sponsored by the Defense Advanced Research Projects Agency (DARPA), the BDE-BSTS was developed for use by the U.S. Army National Guard (ARNG). The prototype BSTS comprised 13 courses for training brigade staff officers in individual functional areas and those tasks required to prepare staffs for collective battle staff tasks. The BSTS program, sponsored under the DARPA program umbrella of Simulation in Training for Advanced Readiness (SIMITAR), is coordinated with three other programs: Simulation-Based Mounted Brigade Training Program (SIMBART), Simulation-Based Multiechelon Training for Armor Units (SIMUTA), and Combat Service Support (CSS) Training System Development for the National Guard.

RR 1706 Canceled.

RR 1707 Commanders' Survey: School for Command Preparation Feedback, Frame, A.A.; Lussier, J.W January 1997. (AD A328 412)

The School for Command Preparation, Command and General Staff College, Fort Leavenworth, KS provides three sequential courses for battalion and brigade command selectees. All command designees attend the PreCommand Course (PCC). PCC provides common understanding of current doctrine, and up-to-date information on Army-wide policy, programs and special items of interest. In conjunction with PCC, spouses are invited to attend the Command Team Seminar (CTS). With commanders, they gain awareness of issues that impact families, the unit, and the community. The remaining two courses, the Tactical Commanders' Development Course (TCDC), and the Battle Commanders' Development Course (BCDC) emphasize warfighting skills and the art of battle command for tactical leaders. The Fort Leavenworth Research Unit developed a survey instrument to obtain commanders' assessment of courses following assignment to their commands. Commanders who had attended these courses in the previous 2 years were solicited for feedback. They gauged the usefulness of topics presented, and indicated their level of agreement with statements regarding the courses. They were asked what issues they felt were not addressed during the course and what they

would share with incoming commanders. Responses (N=254) were compiled and analyzed. All courses received positive evaluations. Many commanders desired discussions with experienced commanders to cover OPTEMPO, resource constraints, and personnel management issues. Feedback provided useful suggestions and current trends.

RR 1708 Developing an Automated Training Analysis and Feedback System for Tank Platoons, Brown, B.; Wilkinson, S.; Nordyke, J.; Riede, D.; Huyssoon, S.; Aguilar, D.; Wonsewitz, R. May 1997. (AD A328 445)

The Army has adopted the After Action Review (AAR) process as the means of providing feedback after collective training exercises, and the quality of AARs depends upon how well trainers can prepare and use data displays to show what happened during exercises and guide interactive discussions on how to improve unit performance. A previous report described a demonstration of the capability of the Automated Training Analysis and Feedback System (ATAFS) to automatically generate AAR aids after exercises in the networked simulator environment. This report describes the results of a follow-on effort to complete the development of the complete set of planned AAR capabilities and test the prototype ATAFS in a mix of Army National Guard training environments.

RR 1709 Enhancing Performance in Light Infantry Digital Tactical Operations, Graham, S.E.; Valentine, P.J.; Washington, L.E. June 1997. (AD A328 676)

At the request of the Commanding General, U.S. Army Infantry Center, this report assesses whether current digitization efforts for the light forces are addressing the specific needs of light forces, as opposed to more simply migrating heavy/mechanized digital solutions to light platforms. Twelve Infantry leaders, selected by the Chief, Dismounted Battlespace Battle Lab, provided information: the most critical digital concerns for light Infantry; differences between light and heavy tactical operations centers (TOCs); battle captain requirements; modifications of light Infantry tactics, techniques, and procedures (TTPs) resulting from digitization; and "soldier as a platform" requirements. The most frequently mentioned light Infantry TOC concern was the need for user-friendly, information management capabilities that will allow: situational awareness of friendly and enemy units, more accurate and simpler battle tracking, and integrated access to information across battlefield operating systems. Responses also indicate significant efforts must be made to minimize information overload. New training programs, TTPs, and automated tools must be developed to permit full utilization of new digital capabilities. The new digital systems must be lightweight, durable, and maintainable, and contain reliable communication links with adequate bandwidth. Relevant results from the Warrior Focus and Focused Dispatch Advanced Warfighting Experiments are also summarized.

RR 1710 Report on the Expanded Methodology for Development of Structured Simulation-Based Training Programs, Campbell, C.H.; Deter, D.E.; Quinkert, K.A. June 1997. (AD A328 671)

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and the Force XXI Training Program have sponsored the development of a structured simulation-based

training program for selected staffs of conventional mounted brigades. The development effort, entitled the *Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation* (and known as COBRAS) resulted in construction of training support packages (TSPs) for large-scale exercises and for small-group vignettes. Development of the scenario and all TSP materials followed the guidance found in the *Methodology for the Development of Structured Simulation-Based Training,* published by ARI in 1995. This report documents an expanded methodology, based on experience in the COBRAS program. The expansion is contained in the *Guide for Development of Structured Simulation-Based Training.* The Guide contains additional examples and warnings, and more in-depth coverage of TSP construction and formative evaluations. This report discusses the activities in the methodology.

RR 1711 Analysis of Command and Control Battlefield Functions as Performed in the Armored Brigade, Ford, J. P.; Mullen, W.J.; Deesling, J.W. June 1997. (AD A328 661)

The purpose of the research was to document the synchronization required by command and control tasks performed within the armored brigade, to include CS/CSS units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the Brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs.

RR 1712 Audio Teletraining for Unit Clerks: A Cost-Effectiveness Analysis, Wisher, R.A.; Priest, A.N.; Glover, E.C. June 1997. (AD A337 689)

A cost-effectiveness analysis of training Army National Guard soldiers by audio teletraining technology was conducted. the trainees were n=225 soldiers nationwide. About half of the trainees received training in a 3-week Unit Clerk Course through traditional residence training at the Professional Education Center in Little Rock, AR. The remainder received the same instruction by the same instructors through audio teletraining, a low-cost training technology. Objective performance data were collected from written tests on 16 of the 47 tasks taught. Trainees in the audio teletraining group had a 93% Go rate (on first attempt), which was significantly higher (by statistical test) than the 85% Go rate for the residence group. In comparing costs, the audio teletraining group had lower training costs, on average $1,135 per trainee. This was due primarily to an avoidance of travel costs for the audio teletraining group. Projected on an annual basis, the Army National Guard can save $292,404 per year through the use of audio teletraining for the Unit Clerk Course.

RR 1713 Tactical Communications Research and Development Requirements from Signal and Behavioral Science Perspectives, Finley, D.L. June 1997. (AD A337 680)

Requirements are described for research on the effects of signal realities on Army warfighters to minimize their frequency of occurrence and adverse impacts. "Signal realities" are defined as degradation of electronic communications and automation capabilities as can occur during tactical operations under actual dynamic battlefield conditions. This report analyzes the realities and consequences of battlefield communications degradation; Signal Branch roles in combat; warfighter tendencies to overlook signal realities during operations and exclude realistic communications problems from training; and behavioral science literature on this topic. Based on this information, research goals are specified to identify and clarify effects of degraded signal on battle processes and outcomes; how procedures might be modified to avoid, or adjusted to overcome, these effects; interdependent relationships between signal and warfighter tasks when conducting collective missions, and those tasks best accomplished jointly; and how to improve, through training, battlefield tactical operations supported by signal equipment capabilities. Research areas supporting these goals are then discussed. These include specifying the impacts of communications capability on battle processes and outcomes; identifying training requirements; answering related training research questions and concerns; exploring possible changes in soldier functions, duties, and organization; and developing tools to aid digital battlefield performance.

RR 1714 Preliminary Evaluation of the Computer-Based Tactics Certification Course--Principles of War Module, Pleban, R.J.; Brown, J. B.: Martin, M.1 July 1997. (AD A337 673)

This report describes a portion of the U.S. Army Research Institute for the Behavioral and Social Sciences Infantry Forces Research Unit's work in the formative evaluation of the computer-based Tactics Certification Course (TCC)--Principles of War Module. Sixteen subjects from the U.S. Army Infantry School were randomly assigned to one of two groups. The experimental group received the computer-based instructional version of the Principles of War module and an end-of-module quiz. Subjects assigned to the control condition received only the end-of-module quiz. In addition to the quiz, subjects completed a background/computer experience survey and a questionnaire assessing their opinions on selected aspects of the Principles of War module. Subjects in the experimental group answered significantly more quiz items correctly (88.9%) than did subjects in the control condition (48.1%). Ratings of selected aspects of the module varied. Certain sections of the module clearly needed to be modified. Other sections required only minor refinements. The overall ratings of the instructional value of the course were positive. The results from this research will be used to refine selected areas of the module.

RR 1715 Battle Staff Training System in Support of Force XXI Training Program: Methodology and Lessons Learned, Andre, C.R.; Wampler, R.L.; Olney, G.W. September 1997. (AD A338 728)

This report documents the methodology and lessons learned in the development of the Innovative Tools for Brigade and Below Staff Training - Battle Staff Training System

(ITTBBST-BSTS). The ITTBBST-BSTS consists of functional area training support packages (TSPs) for individual battalion and brigade level staff officers. The TSPs combine computer-based instruction (CBI) and text. Each TSP presents a course of instruction as CD-ROM based programs and supplemental text-based instruction with a training management system. Courses train commanders and staff officers in their individual combat skills to enhance their proficiency in synchronization of battlefield operating systems. The ITTBST-BSTS was developed for use by the Total Force, Active and Reserve, and designed for use in a local area network, wide area network, or stand-alone computer mode. An internal review and external evaluation process supported revision of each TSP. The final products included the TSPs, a User's Guide, and a System Administrator's Guide.

RR 1716 Selected Training Practices for Military Operations in Urban Terrain (MOUT), Sulzen, R.H. September 1997. (AD A335 862)

The Army and Marine Corps both consider Military Operations in Urban Terrain (MOUT) to be a central part of future training and together have a joint MOUT Advanced Concept Technology Demonstration (ACTD) underway. Training facilities for military and law enforcement agencies include firing ranges, mock towns or villages, and shoot houses. Makeshift facilities for dry-fire drills include engineer tape staked out on the ground and rooms in any building available. Training in Close Quarter Combat (CQC) is offered in Army and Marine Corps training courses. Training time was mostly allocated to live fire and live simulation. Team dry-fire drills were often extensively practiced before team live fire, but considered as a part of the safety training required as a part of live firing. Before team live-fire training, Army units usually conduct individual marksmanship training. In many cases, standards were set for individual qualification before soldiers could participate in team live fire. Live simulation was both with the multiple integrated laser engagement system (MILES) and Simunition. Law enforcement agencies (including Military Police) and Marines were more likely to use Simunition. Those using Simunition who also had experience with MILES preferred Simunition for live simulation training.

RR1717 Combat Support and Combat Service Support Expansion to Virtual Training Program SIMNET Battalion Exercise: History and Lessons Learned, Hoffman, R.G. November 1997. (AD A341201)

This report describes the addition of combat support (CS) and combat service support (CSS) training to the battalion exercises of the Virtual Training Program (VTP) at Fort Knox, Kentucky. Training support packages (TSPs) provide battalions with all of the background needed to step into the simulation networking facilities (SIMNET) and begin training. Trial units were generally positive about the training opportunities for the mortar, medical, maintenance, and support platoon leaders. Opportunities to practice battle tracking, communications, and coordination were cited as significant benefits by training participants. The lessons learned include insights concerning:

- the benefits of mixing CSS functions in a structured, maneuver execution exercise,
- the need to simultaneously consider training scenario and simulation capabilities when selecting tasks for a training exercise,

- the evolution of training design and the need to systematically incorporate lessons learned from the ongoing implementation of the VTP program,
- the importance of partnership with the O/C team for developing new training components for the VTP, and
- the robustness of the training design to the use of the unit's own order during the exercise.

These themes are not new; however, after several years of continuing development efforts, conclusions are changing.

RR1718 Staff Group Trainer: Development of a Computer-Driven, Structured, Staff Training Environment, Koger, M. E., Quensel,S. L., Sawyer, A.R, Sanders, J.J., Crumley, K.A., Brewer, J.D. and Sterling, B.S. March 1998. (AD A347074)

The Staff Group Trainer Project was a research and development effort sponsored by the US Army Research Institute for the Behavioral and Social Sciences in coordination with the Force XXI Program. The project produced two training support packages (TSP)--battalion and brigade-(designed to train these staffs to more effectively and efficiently communicate within and between staff sections, command post and the unit commander. Based on tactical scenarios developed for the Virtual Training Program, both TSPs focused on staff functions that support the military decision-making process within the execution phase of the movement to contact, deliberate attack, battalion defense in sector and brigade area defense missions. The TSP design and development were based on lessons learned from previous Virtual Training Program efforts, structured design methodology, and adult learning principles. This report provides details on the Staff Group Trainer Project's history, methodology, and lessons learned.

RR1719 Combined Arms operations at Brigade Level, Realistically Achieved Through Simulation I (COBRAS I): Report on Development and Lessons Learned, Graves, C.R., Campbell, C.H., Deter, D.E. & Quinkert, K.A. December 1997. (AD A343683)

This report presents the development of the U.S. Army's Force XXI Training Program's Combined Arms Operations at the Brigade Level, Realistically Achieved Through Simulation I (COBRAS I) training program for the brigade staff. The COBRAS I program provides structured, simulation-based training on basic staff skills for conventionally-equipped forces and consists of two types of exercises: a Brigade Staff Exercise for the brigade commander and his staff, and smaller Brigade Staff Vignettes for segments of the staff. The report highlights the program's background and design efforts (e.g., task identification, scenario design), the construction of the training support package (TSP) materials, and the resulting exercises and TSPs; formative evaluation methods and results are included throughout this discussion. The report concludes with a discussion of lessons learned regarding future program development and an introduction to the COBRAS I follow-on effort (COBRAS II) that will enhance the capability of the program to satisfy the U.S. Army's training needs.

RR1720 Designing Multi-media to Train the Thermal Signatures of Vehicles, Dyer, J.L., Shorter, G.W. & Westergren, A.J. March 1998. (AD A342475)

Guidelines for using multi-media technology to train the thermal signatures of combat vehicles were developed from training effectiveness experiments with a prototype multi-media

program and the instructional design literature. The guidelines specify requirements for a database of thermal images. The database must be constructed to support vehicle recognition/identification exercises as well as in basic instruction on thermal technology and on thermal cues. Factors to consider in developing vehicle recognition exercises are presented, to include the exercise format, establishment of vehicle sets, selection of part-task training schedules, and the type of feedback needed for soldiers and instructors. How to generate training strategies that adapt to the skill level of the soldier is described. Flexibility in the instructional design is stressed as the primary means of meeting the varied training requirements within the military. The need for an instructor's guide describing how to maximize the training features in a flexible training program is emphasized. The guidelines were applied to a multi-media, thermal training program developed in conjunction with the Night Vision and Electronic Sensors Directorate and the Product Manager for Forward Looking Infrared.

RR1721 Assessment of the SIMITAR Gunnery Training Strategy Through Development of A Database of Gunnery Outcome Measures, Smith, M.D. February 1998. (AD A344930)

This report assesses the impact of the Simulation in Training for Advanced Readiness (SIMITAR) compressed gunnery training strategy for Army National Guard (ARNG) armored and mechanized infantry units. This strategy emphasizes the use of state-of-the-art training aids, devices, simulators, and simulations (TADSS) in response to challenges posed by time and range constraints experienced by ARNG combat units. Assessment entailed development of a longitudinal database of gunnery-related information generated before (1993-1994) and during (1995-1997) SIMITAR strategy implementation (see Smith, in publication). This information was collected from armored and mechanized infantry units from a SIMITAR test brigade and from six enhanced no SIMITAR "comparison" brigades. Overall, the SIMITAR training strategy was successful. Results showed that final, crew-level, tank gunnery qualification on Table VIII did not differ either between the SIMITAR and comparison units, or within the SIMITAR test unit, across data collection years. Bradley Fighting Vehicle Table VIII qualification rate, however, did favor the comparison units. Perhaps more importantly, the SIMITAR strategy permitted most (94%) fully staffed SIMITAR platoons to complete gunnery Table XII (with a 45% overall qualification rate) and enabled company and higher level maneuver training objectives to be accomplished, all within a normal 39-day yearly training calendar. Suggestions for research needed to extend SIMITAR training strategy benefits are provided.

RR 1722 Sustaining and Improving Structured Simulation-Based Training, Bessemer, D.W. & Myers, W.E. May 1998. (AD A344895)

The U.S. Army Simulation, Training, and Instrumentation Command (STRICOM) is developing the Close Combat Tactical Trainer (CCTT) to support maneuver training for platoon and company units. The CCTT is the first part of the Combined Arms Tactical Training (CATT) system providing operational training for combined arms forces on a virtual battlefield. The U.S. Army Research Institute (ARI) also is developing structured CCTT training support packages (TSPs) for required mission and task training. Successful structured training in the Virtual Training Program (VTP) with Simulation Networking (SIMNET) established a model for similar

CCTT training. This report examines integrated system management needed to implement successful training with the CCTT and its TSPs. While CCTT development has focused on simulation requirements, and TSP development has focused on training requirements, total system management has been a secondary consideration. Conceived in a Total Quality Management (TQM) framework, the report proposes processes designed to sustain and improve the training effectiveness of the CCTT throughout the system life. The emphasis is on continuous monitoring of training processes and products to provide management feedback, and establishing process action teams to define and solve system problems. The report identifies some training process indicators, and possible management support tools.

RR1723 Canceled.

RR1724 Full Crew Interactive Simulation Trainer-Bradley (FIST-B): Limited User Assessment, Salter, M.S. May 1998. (AD A345818)

This report documents a limited user assessment of the prototype Full Crew Interactive Simulation Trainer – Bradley (FIST-B) training device. FIST-B provides a turret appended gunnery trainer linked to the engagement skills trainer (EST). Bradley squads can train selected squad level collective tasks together using the same computer-generated database. The assessment examined the capabilities of the FIST-B system through a series of user exercises. Bradley squads completed training scenarios, questionnaires and structured interviews. The FIST-B system had both strengths and weaknesses. An important factor in considering the results is the small sample size and prototype nature of the device. The gunnery (Mode I) portion of FIST-B had minimal testing as it mimics proven gunnery simulators. The value of squad collective training capabilities (Mode II), integrating the crew and the dismounts, was difficult to assess. Due to limitations in scenarios, constraints of the EST, and overall system reliability, the link of the crew to the dismount in movement to contact, attack, and defend scenarios was of limited benefit. For most squad collective tasks tested, the FIST-B and EST integration offered few advantages. The device, however, did show potential for integration of new personnel, and to build squad cohesion.

RR1725 Follow-on Development of Structured Training for the Close Combat Tactical Trainer, Deatz, R.C.; Forrest, D.; Holden, W. T.; Sawyer, A. R.; Britt, D. B.; Gray, R. July 1998. (AD A350545)

This report describes the work done on the "Structured Training for Units in the Close Combat Tactical Trainer-2" (STRUCCTT-2) Project, a follow-on to the STRUCCTT Project. The purposes of this project were to: (a) develop additional exercises for inclusion in the initial training support packages (TSPs), and (b) develop an orientation course TSP and exercises which are necessary to support the Close Combat Tactical Trainer (CCTT) complete system fielding. This report first summarizes the background (the use of structured simulation-based training in CCTT) and identifies the technical objectives for the project. The development section discusses the processes used to create the TSPs. The formative evaluation section details the project evaluation strategy and method and includes a description of exercise and TSP testing and modification. Following this segment, the lessons learned present issues

regarding this project's processes and product development which provide insight and direction for additional developmental work. The final section of the report contains a discussion of recommendations for future TSP development.

RR 1726 Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation II (COBRAS II): Report on Development and Lessons Learned, Campbell, C.H., Graves, C.R.; Deter, D.E., Quinkert, K.A.. August 1998. (AD A352029)

This report presents the development of the U.S. Army's Force XXI Training Program's Combined Arms Operations at the Brigade Level, Realistically Achieved Through Simulation II (COBRAS II) training program. The COBRAS II program extends prior training research, providing expanded structured, simulation-based training for conventionally-equipped brigade staffs. A Brigade Staff Exercise (BSE) for the brigade commander and staff represents one program component. This BSE succeeds the original (COBRAS I) BSE by incorporating a wider audience. The second component is a set of brigade staff vignettes. It augments the COBRAS I vignette library by including training for brigade staff members and staff processes not covered in COBRAS I vignettes. This report describes the COBRAS II program background, design and development efforts, and the resulting exercises and training support packages. The report discusses lessons learned regarding future program development, and concludes with an introduction to the COBRAS II follow-on effort that employs COBRAS II project and related research findings in the development and testing of logical next steps in Force XXI Training Program efforts.

RR1727 Structured Training for Units in the Close Combat Tactical Trainer: Design, Development, and Lessons Learned, Flynn, M. R., Campbell, C. H., Myers, W. E., Burnside, B. L. September 1998. (AD A354171)

This report describes the "Structured Training for Units in the Close Combat Tactical Trainer (STRUCCTT)" Project. The purposes of this project were to: (a) design and develop a basic core set of exercises to support initial Close Combat Tactical Trainer (CCTT) user testing and future fielding, and (b) develop an exercise framework within which future exercises can fit as part of a contextually complete family of exercises. This report first describes the background of this initiative (the use of structured simulation-based training in CCTT) and identifies the objectives laid out for project completion. It then discusses the project's design, development, and formative evaluation processes. The design section describes the processes and procedures involved in creation of the exercise mission scenarios and training objectives. The development section highlights the processes that comprise and contribute to the creation of completed exercises, to include training support packages and demonstrations of performance. The formative evaluation section describes the project evaluation strategy and methodology, and the processes by which exercise testing and modification were conducted. Following this section, the lessons learned section presents issues which framed the project's progress and development, and which may provide insight and directions for additional developmental work. A final concluding section discusses the ramifications of this project, with recommendations for future development efforts.

RR1728 Cognitive Requirements for Small Unit Leaders in Military Operations in Urban Terrain, Phillips, J.. McDermott, P.L., Thordsen, M., McCloskey, M., and Klein, G. September 1998. (AD A355505)

Military Operations in Urban Terrain (MOUT) create unique cognitive demands for small unit leaders, particularly platoon leaders. Years of experience are typically needed to master these demands. However, most platoon leaders tend to have more experience in Army operations generally, and MOUT operations specifically. A cognitive task analysis, based on in-depth interviews with subject matter experts (n = 7), was conducted to expose the cognitive aspects of expertise existing within one important MOUT task, building clearing operations. From the perspective of platoon leaders, the cognitive demands of this task were defined within the context of decision requirement tables. Decision requirements detail critical decisions and judgments, the reasons why they can be difficult to make, cues and factors that influence decision making, and strategies employed in the decision making process. The findings of the cognitive task analysis guided the development of training recommendations, particularly the need for a scenario-based MOUT training program aimed at improving platoon leader expertise through practice in decision making.

RR1729 Battle Staff Training System II: Computer-Based Instruction Supporting the Force XXI Training Program, Wampler, R.L. and Livingston, S.C. November 1998. (AD A359252)

This report documents the methodology and lessons learned in the development of the Innovative Tools and Techniques for Brigade and Below Staff Training II - Battle Staff Training System II (ITTBBST-BSTS II). This effort supported the Army's distance learning initiative by developing three computer-based training (CBT) courses of instruction on CD-ROM. An existing Brigade Common Core training support package (TSP) was converted from a text and computer-based TSP to a 100% CBT course with limited adjunctive text materials. In addition, TSPs were developed for the Training Developer and CBT Author to train them to update and maintain an existing library of courses. These TSPs were also 100% CBT. The ITTBBST-BSTS II Brigade Common Core course can replace the similar course in the existing BSTS library of courses for use by the Total Force. The Training Developer and CBT Author courses are designed for use at an institution with responsibility for updating and maintaining BSTS courseware. The Brigade Common Core and Training Developer courses are designed for use in a local area network, wide area network, or stand-alone computer mode. The CBT Author course is designed for stand-alone use only.

RR1730 Review of Battle Staff Training Research at Brigade and Battalion Levels, Sterling, B.S. and Quinkert, K.A. December 1998. (AD A359259)

This report provides a foundation for future research and development on battle staff training by providing examples of structured training programs for the battle staff. Critical deficiencies in battle staff training were highlighted for both individual and collective skills. Reviews were performed for (1) military articles on how to improve battle staff performance, centering on use of simulations in a structured training program, and (2) research and development programs to improve battle staff training. Also, possible future directions for battle staff training were discussed.

RR1731 Assessing Battle Command Information Requirements and the Military Decision Making Process in a Concept Experimentation Program, Lickteig, C.W., Sterling, B.S., Elliott, G.S., Burns, J.E. & Langenderfer, J.E. December 1998. (AD A359897)

This report describes a concept experimentation assessment of battle command information requirements and military decision making in the 2010-2015 timeframe. This research was the first in a series of concept experimentation programs (CEPs) planned by the Mounted Battlespace Battle Lab (MBBL) at Fort Knox, KY, to re-engineer command and staff operations. This report focuses on research methods, exploratory results, and recommendations on method improvements for assessing battle command information requirements and the military decision making process (MDMP). The exploratory results provide a benchmark for future efforts and suggestions for improving information systems and future evaluations. Limitations and lessons learned on research methods are considered. Method recommendations address measurement approach issues, such as mission, enemy, terrain, troops, and time (METT-T) structure for determining information requirements, and the applicability of the MDMP in a real-time information environment. Recommendations on manual measures address the timing and scope of assessment and respondent workload. Finally, recommendations on instrumented measures stress reducing respondent workload and increasing measurement scope and precision.

RR1732 The COBRAS Synthetic Theater of War Exercise Trial: Summary and Report of Findings, Campbell, C.H., Campbell, R.C., Ford, L.A., Pratt, D.M. & Deter, D.E. December 1998. (AD A359935)

This report gives an abbreviated summary of the development and implementation conditions and the findings for the Synthetic Theater of War (STOW) Exercise Trial, conducted at Fort Knox, KY in March 1998. The trial results indicate that there is potential for realizing training value from STOW-type training, and that training support materials can be developed using the same model and procedures used for other Force XXI Training Program exercises. However, improvements to the simulation systems and linkages, the communications systems,

and the physical layout are needed prior to further research on training value. Details about the full preparation process, reasons for decisions, and data that support the reported findings are contained in RR1734 (*The COBRAS Synthetic Theater of War Exercise Trial: Report on Development, Results, and Lessons Learned* Campbell, Pratt, Deter, Graves, Ford, Campbell, & Quinkert).

RR1733 Evaluation of Dismounted Infantry Simulation Technologies (E-DIST), Ford, P. and Andre, C.R. December 1998. (AD A360813)

This report describes the assessment of five simulators that train dismounted infantry tasks. Subject matter experts (SMEs) worked through leader, soldier, or team scenarios and rated how well each simulator supported performance of subtasks related to military operations in an urban environment. The SMEs also identified characteristics to be considered for future simulators and modifications that would improve the current systems. The recommendations are the basis for characteristics to be considered in the training Device Requirement for a Dismounted Infantry Module in the Close Combat Tactical Trainer.

RR1734 The COBRAS Synthetic Theater of War Exercise Trial: Report on Development, Results, and Lessons Learned, Campbell, C.H., Pratt, D.M., Deter, D.E., Graves, C.R., Ford, L., Campbell, R.C., and Quinkert, K.A. January 1999. (AD A359923).

This report details the design and development process for the Synthetic Theater of War (STOW) exercise produced in the COBRAS III project. The exercise was to serve as the vehicle for three primary research areas: training support package and resource requirements, technology and infrastructure requirements, and potential for training value. The multiechelon training audience of the Brigade Combat Team included the brigade commander and staff, the commander and staff of one battalion task force (TF), and the line company commanders, first sergeants, fire support team leaders, and scout platoon of that TF. The STOW environment linked constructive simulation (the Brigade/Battalion Battle Simulation [BBS] and Modular Semi-Automated Forces [ModSAF]) and virtual simulation (Simulation Networking [SIMNET]) and reconfigurable simulators). The trial implementation in February - March 1998 involved members of TF 1-101, 3rd Brigade, and 42nd Infantry Division of the New York National Guard, along with supporting participants from the Force XXI Training Program, contracted logistics support (CLS) staffs, and the COBRAS Team. Training support was found to be manageable but resource-intensive. Technology and infrastructure findings were mixed: the systems promise exciting training opportunities, but there were many suggestions for improvement from participants. From the unit members' point of view, the exercise provided valuable training, and there was strong support for continued STOW and reconfigurable simulator development and use.

RR1735 Development of a Refined Staff Group Trainer, Quensel, S.L., Myers, W. E., Koger, M. E., Nepute, J. T., Brewer, J.D., Sanders, J. J., Crumley, K.A., and Sterling, B.S. February 1999. (AD A359918)

This Staff Group Trainer (SGT) project was a research and development effort sponsored by the U.S. Army Research Institute for the Behavioral and Social Sciences in

coordination with the Force XXI Training Program. As a follow-on effort to the previous SGT project, the goal was to refine a brigade-level staff training program to more effectively and efficiently coordinate the activities within and between the individual staff sections in the brigade command post. The program was designed to deliver training to newly formed, inexperienced staffs conducting the staff functions that support the military decision-making process within the execution phase of the brigade area defense mission. Program design and development were based upon lessons learned from the previous SGT effort, structured design methodology, instructional systems design techniques, adult learning principles, as well as team and mental model research. The refined training program further demonstrated the capability of structured, computer-driven, collective staff training. It advanced the techniques for development of structured staff training and integration of technology into the training process. The program incorporated innovative features including automated performance measures and structured feedback. This report provides details on the SGT background, design concept, technology development process, training support package development process, formative evaluation techniques, lessons learned, and conclusions.

RR1736 Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation III (COBRAS III): Report on Development and Lessons Learned, Campbell, C.H., Deter, D.E., Ford, L.A., Graves, C.R., Campbell, R.C., Pratt, D.M., Jenkins, S.N., and Quinkert, K.A. February 1999. (AD A359920)

This report describes development of the multiechelon Brigade and Battalion Staff Exercise (BBSE), a product of the third project entitled "Combined Arms Operation at Brigade Level, Realistically Achieved Through Simulation" (COBRAS III). The BBSE is a structured simulation-based exercise of three missions. It provided multiechelon practice opportunities for the commanders and staffs of the conventionally equipped brigade and its maneuver battalions. The focus is on multiechelon performance objectives that cross battlefield functions. Implementation conditions include 24 hour operations, deployed command posts, concurrent planning and execution. Program evaluation date were collected during a trial implementation with 3 Brigade, 2 Infantry Division (Fort Lewis). The results of the data analysis indicated that the training support package (TSP) was adequate in content and organization. Training audience members and observers perceived the training as valuable, especially but not exclusively for experienced staff preparing for a deployment or combat training center (CTC) exercise.

RR1737 Structured Simulation-Based Training Program for a Digitized Force: Approach, Design, and Functional Requirements, Volume 1, Dierksmeier, F.E., Johnston, J.C., Winsch, B.J., Leibrecht, B.C., Sawyer, A.R., Quinkert, K.A., and Wilkinson, J.G. February 1999. (AD A361534)

This report describes one of the Army's latest efforts to address the changing training requirements driven by advances in warfighter technologies. The modification of training delivery systems and training programs to incorporate the unique requirements brought about by digital warfighting technologies moves the Army closer to meeting the training challenges of battlefield digitization. The current research effort, the Training for the Digital Battlefield program, also known as the Close Combat Tactical Trainer-Digital (CCTT-D), was designed to

ascertain the anticipated requirements associated with using the CCTT (or a similar training delivery system) to conduct training for digitally-equipped platoon through brigade units. The requirements analysis was two-fold. First, it focused on technology capabilities; tactics, techniques, and procedures; scenario design and development; and the structure of training materials specific to the CCTT. Second, it provided a training approach and an analysis of technology requirements that encompass the entire Army. This report spans two volumes. Volume I presents the methods and products of the research effort, featuring an overarching training approach and a training system analysis for delivering digital operations training to Force XXI. Volume II presents the supporting documentation related to this research effort.

RR1738 The Division Level Military Decision-Making Process (MDMP): Design and Development of a Prototype Computer-Based Training Product, Centric, J. H. and Salter, M.S. March 1999. (AD A361259)

This report documents the analysis, design, and development of the Division Level Military Decision-Making Process (MDMP) training product. The division level MDMP product is a computer-based, stand alone training support package envisioned to be used by the U.S. Army Command and General Staff College (CGSC) to augment existing CGSC instruction on the MDMP. The product, a computer disk, provides a self-paced, detailed discussion of the steps of the MDMP, focusing on the battle staff at the division-level. Field Manual 101-5 Staff Organization and Operations served as the doctrinal source reference. The course also contains selected tactics, techniques, and procedures (TTP) that aid the CGSC student in conducting staff integration and coordination during mission planning. This project was coordinated with the CGSC.

RR1739 The Commanders' Integrated Training Tool for the Close Combat Tactical Trainer: Design, Prototype Development, and Lessons Learned, Gossman, J.R., Beebe, M.E., Bonnett, M., Forrest, D., Shadrick, S.B., Dannemiller, B., Mauzy, R P., and Bonnett, M. April 1999. (AD A364066)

This report describes the design of the Commander's Integrated Training Tool (CITT) for the Close Combat Tactical Trainer (CCTT), a system of armored vehicle manned module simulators and workstations that allows units to train collective armor and infantry tasks at the platoon through battalion task force level. CITT will allow commanders and other unit trainers to select, create, or modify structured training exercises for use when the unit trains using the CCTT. Although the project focused on the CITT design, it also included the development and refinement of a CITT prototype in standalone and distributed internet accessible versions. Additionally, the project included the development of an information overview presented in the form of videotapes and included in the CITT prototype, and the development of an implementation strategy and fielding plan. This report describes the activities involved in the development of the listed products along with the lessons learned during project completion.

RR1740 Human Dimensions of the Task Force XXI Advanced Warfighter Experiment, Christ, R.E., Bliese, P.D., Escolas, S.M., and Castro, C.A. April 1999. (AD A364608)

This human dimensions assessment quantified the impact of changes in the work environment of soldiers and leaders who participated in the brigade-level task force (TF XXI) Advanced Warfighter Experiment (AWE). The TF XXI AWE investigated the potential for digitizing land combat forces through the fielding of new technology equipment and accompanying changes in organizational design, tactics, techniques and procedures. Surveys and structured interviews were used to assess soldier and leader perceptions of TF XXI, the work environment, and organizational outcomes. The major finding is that as soldiers and leaders became more familiar with the new technology and its use, they were less threatened by it, and appreciated more the positive impact it would have on them, their units, and the Army as a whole. The findings also underscore potential problems with a number of different but clearly interrelated human dimensions. One example is the new career opportunities created by this technology within but also outside the Army, and the possible impact of these opportunities on Army-wide personnel retention and recruitment programs. This study contributes to the requirement to define, quantify, and record empirical information to more fully understand and respond to the human dimensions of the Force XXI program.

RR1741 What Soldiers Say About Night Operations, Volume I: Main Report, Dyer, J.L., Pleban, R.J., Camp, J.H., Martin, G. H., Law, D., Osborn, S. M., and Gaillard, K. April 1999. (AD B243649)

A trend analysis of issues surrounding night operations, specifically the deliberate night attack, was conducted. The initial analysis was done in 1992-1993; the follow-on analysis in 1998. During this period, additional night equipment was fielded to units as a result of the Army's "Own-the-Night" effort. In each phase of the research, soldiers and leaders from different infantry units as well as the Joint Readiness Training Center (JRTC) observer/controllers (OCs) and opposing force (OPFOR) participated in surveys and follow-on interviews. The tasks and subtasks examined were based on the Mission Training Plan for the deliberate night attack. Areas that remained problems over the six-year period were identified, and soldiers' reasons for these problems delineated. There was high agreement over time regarding problems within each group surveyed and across groups. The JRTC OPFOR had the most unique perspective on problems. Most operational changes reflected the changes in equipment available to units. New equipment solved some operational problems, but often raised new training and employment issues. The difficulty with some areas was not a function of equipment, but related more fundamentally to soldier, leader, and unit expertise and discipline during night operations. Volume II (ARI Research Note 99-22) contains the appendixes.

RR1742 Dismounted Warrior Network Enhanced Restricted Terrain (DWN ERT): An Independent Assessment, Salter, M.S., Eakin, D.E., and Knerr, B.W. May 1999. (AD A364607)

This research encompassed the second in a series of experiments on the functional capabilities of a collection of four Virtual Individual Combatant (VIC) simulation technologies linked in the Dismounted Warrior Network (DWN). These experiments (user and engineering) provided enhanced restricted terrain (ERT), an improved database and VIC systems. The intent was to demonstrate a reliable low cost easy to use way to insert Dismounted Infantry into synthetic virtual environments. Multiple agencies collaborated over several months; experimentation occurred in July 1998. Data collection occurred at the U.S. Army Infantry Center's Dismounted Battlespace Battle Lab Land Warrior Testbed and the Fort Benning McKenna Military Observations on Urban Terrain (MOUT) site. The four VICs were networked and the individual soldiers in their VICs appeared (visually) to each other in the virtual environment. User exercises measured the VICs' ability to support the individual soldiers as part of a team performing a collective virtual task of room clearing. The MOUT data collection was an attempt to observe the soldiers in actual room clearing. The U.S. Army Research Institute provided man-in-the-loop observations, results of questionnaires and structured interviews.

RR1743 An Assessment of the Values of New Recruits, Ramsberger, P.F., Wetzel, E.S., Sipes, D. E., and Tiggle, R. July 1999. (AD A371581)

The senior leadership of the Army realizes the important role values play in the Army. Values allow the operating norms and rules of the Army to become meaningful, stable, positive; and hence, capable of being internalized. In the past, the Army has collected data on the values of active duty soldiers. However there is only limited knowledge of the values new recruits bring to the Army or their relationship to the seven core values- Loyalty, Duty, Respect, Selfless Service, Honor, Integrity, and Personal Courage-emphasized by the Army leadership. In this effort, these core and other values were assessed among entering Active Army recruits so as to establish the basis for tracking soldier values from initial entry training through the first tour of duty.

RR1744 Weapon Zeroing with the Laser Marksmanship Training System (LMTS), Hagman, J.D., and Smith, M.D. August 1999. (AD A369654)

This research examined the Laser Marksmanship Training System's (LMTS's) capability to establish a valid weapon (i.e., M16A2 rifle) battlesight zero. A multi-phased approach was used to (a) examine the validity of an LMTS-established zero under live-fire conditions, (b) reexamine this validity using an alternative (presumably more accurate), manufacturer-recommended, LMTS zero calibration procedure, and (c) assess the degree of correspondence between LMTS point of aim and live bullet strike location under stabilized weapon conditions. Only 27% of LMTS-zeroed weapons were found to have confirmable live-fire zeroes, with no benefit resulting from use of the alternative zero calibration procedure. LMTS's aiming point also did not correspond to bullet strike location. Weapon quality was suggested to be a major factor contributing to this lack of correspondence. These findings indicate that an LMTS-established weapon zero may not always correspond to, and thus should not be substituted for, a live-fire-established weapon zero. Consequently, soldiers should not attempt record fire qualification with an LMTS-zeroed weapon without first confirming zero with live ammunition. Range time and ammunition savings resulting from the use of LMTS-zeroed weapons should be modest at best, given the relatively low percentage of LMTS-zeroed weapons found to have valid zeroes. Additional research is underway to examine the feasibility of using LMTS for marksmanship training and evaluation.

RR1745 Prototype Staff Training and Evaluation Models for Future Forces, Throne, M.H., Deatz R.C., Holden, W.T. Jr., Campbell, C.H. Sterling, B.S., and Lickteig, C.W. September 1999. (AD A369663)

The purpose of this report is to document the design, development, and demonstration of a prototype training package to improve staff performance and a prototype performance evaluation package for staffs using advanced command, control, communications, computer, and intelligence (C^4I) systems. These prototypes were implemented in a simulation-based experiment to examine the impact of digital systems on future Battle Command at the battalion and brigade level. This report first presents a review of previous research and relevant literature on training design and evaluation issues. The design and development of the prototype training and evaluation packages are described and are followed by discussions of formative results and lessons learned. The major research products associated with training and evaluation for the implementation are presented in the five-volume set of materials entitled *Training and Measurement Support Package, Battle Command Reengineering III, Mounted Maneuver Battlespace Lab.* The formative evaluation provided valuable information for revisions and additional trials of the prototype training and evaluation package are required to validate its efficacy and utility. Future implementation should lead to further development of this prototype training and evaluation package that targets higher-order cognitive skills needed on the digital battlefield.

Research Products

RP 95-01 Integrating SIMNET into heavy task force tactical training, Heiden, C.G. October 1994. (AD A285 953)

This report describes a procedure used to integrate simulation networking (SIMNET) exercises and traditional field exercises into a coordinated training plan intended to prepare an armor unit for a rotation at the Combat Training Center (CTC). The procedure outlines the development of a Battalion training plan and the training sequence to be followed during the 7 months prior to a CTC rotation. The resulting plan allows commanders to tailor the training sequence to meet unit specific training goals, thus maintaining higher combat readiness at a lower cost. Included is the SIMNET planning package (prepared by SIMNET site staff) that the unit used to plan and execute its simulation-based training.

RP 95-02 Review of division structure initiatives, Ford, R; Burba, E.H., Jr.; Christ, R.E. October 1994. (AD A297 578)

In anticipation of more demanding challenges even as it also experiences declining resources, the Army must reshape its combat organizations to be more versatile. A likely question for this redesign effort is How have divisions evolved to their current status? The project reported here collected and evaluated 208 documents to help answer that question. The focus was set on post-Vietnam initiatives in general and the following five initiatives in particular: Triple Capabilities (TRICAP) study; Division Restructuring/Study/Evaluation (DRS/DRE); Army 86 (Heavy and Infantry Divisions and Separate Brigades); High Technology Light Division (HTLD); and Army of Excellence (AOE) (Light and Heavy Divisions). This report is intended to be a source of information on previous division structure initiatives and an overview of lessons learned from those initiatives. It contains a chronology of division design and structure initiatives, as well as an overview of each initiative and a summary of the major conceptual and organizational features pertinent to each initiative. The main body of the report concludes with a summary of overall trends, recommendations, and persistent issues. The appendices to the report contain abstracts of pertinent documents the authors identified, reviewed, and copied that relate to each of the initiatives.

RP 95-03 Combat leaders' guide: 1994 leader handbook, Salter, M.S. October 1994. (AD A286 010)

The Combat Leaders' Guide (CLG) is a job performance aid for leaders to use as a memory jogger during realistic combat training like that at the Combat Training Centers or in continuous operations environments. The CLG is a pocket-sized, quick reference system to be used by trained soldiers at company, platoon, or squad level. The CLG helps to overcome the potential effects of performance decay over time and during periods of high stress and fatigue. It supports unit readiness by providing a leader with doctrinal, tactical, and technical materials in a quick reference format.

RP 95-04 Trainer's guide for the device-based, time-compressed Army National Guard tank gunnery training strategy, Morrison, J.E.; Hagman, J.D. October 1994. (AD A286 344)

This report is a guide for trainers in Army National Guard (ARNG) armor units for a device-based gunnery training strategy. The purpose of the strategy is to reduce or compress the time required to prepare for tank crew gunnery qualifications (i.e., Table VIII). The strategy compresses the required training time by (a) limiting training to those skills and knowledges needed for successful Table VIII performance, (b) focusing training on Table VIR engagements that are most difficult to ARNG crews to perform, and (c) allocating device training time to crews that need it most and away from crews that are demonstrably proficient on the training device. The strategy is designed to be implemented at the local level with either the Conduct-of-Fire Trainer (COFT) or the Guard Unit Armory Device Full-Crew Interactive Simulation Trainer, Armor (GUARDFIST I).

RP 95-05 Combat vehicle command and control system architecture overview, Greess, M. October 1994. (AD A286 259)

This Research Product describes and documents the software architecture used in the research and development effort referred to as Combat Vehicle Command and Control (CVCC). This effort was initiated in the late 80's and was conducted in the Mounted Warfare Test Bed at Fort Knox, Kentucky. CVCC incorporated futuristic requirements for command, control, and communications (C3) systems to be used by armored combat systems of the future. The nature of the program enabled an iterative approach to the development of a user-based system. This system provides modular software that can be tailored to varying levels of operational and experimental requirements. The Product also includes the catalog of CVCC software switches that support rapid configuration of the C3 features developed. Directions for future architecture development are provided in a catalog of change requests derived from user-based assessments.

RP 95-06 Canceled.

RP 95-07 Reserve Component Virtual Training Program (RCVTP) orientation guide, Turecek, J.L.; Campbell, C.H.; Myers, WE.; Garth, T.H. March 1995. (AD A292 885)

This orientation guide acquaints leaders of Armor, Mechanized Infantry, and Cavalry units with the Reserve Component Virtual Training Program (RCVTP). Additionally, it provides leaders with sufficient information to enable them, in coordination with the Fort Knox RCVTP Observation/Controller (O/C) team, to decide on the type of simulation to use and the echelon and level of training to conduct during an Inactive Duty Training (IDT) or Active Training (AT) period at Fort Knox.

RP 95-08 Methodology for the development of structured simulation based training, Campbell, C.H.; Campbell, R.C.; Sanders, J.J.; Flynn, M.R.; Myers, WE. April 1995. (AD A296 171)

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), in coordination with the Advanced Research Projects Agency (ARPA), the U.S. Army Armor School, and the U.S. Army National Guard, has sponsored development of the Reserve Component Virtual Training Program (RCVTP), This structured training program incorporates simulation-based exercises for platoon-, company-, battalion-, and battalion staff-level training. This Research Product provides step-by-step instructions for designing and developing structured simulation-based training. The methodology is based on the RCVTP development effort, and was validated in the further development of cavalry troop exercises.

RP 95-09 The Army command and control evaluation system (ACCES 93) documentation, Hayes, R.E.; Layton, R.L.; Ross, W.A. April 1995. (ADA296 152)

This document is intended to be the basic resource for anyone attempting to use the Army Command and Control Evaluation System (ACCES) to measure command and control performance during a freeplay command post exercise at the division level. The ACCES system is appropriate for use at the brigade and corps levels also, but has rarely been used for other than division level exercises. A comprehensive description of ACCES, its development, and its promise is available in Halpin (1995). This report provides a description of ACCES Version 93 and is current as of the end of December 1993. No further modification of the ACCES methodology is planned at this time. Included as appendixes to this document are the materials necessary for learning how to conduct an ACCES application. They are the result of 3-year contracts with Evidence Based Research, Inc, for specific enhancements to the ACCES system and with Quantum Research International for support in data collection and analysis. Appendix A comprises the nine lessons of the data collectors' program of instruction (DC-POI). Appendix B is the Analyst's POI. Appendix C is the Analyst's Guide. Appendix D gives specific definitions of the ACCES measures. Appendix E contains the Data Collection and Reduction Forms.

RP 95-10 Prototype U.S. Army National Guard armor and mechanized infantry training database: User's manual, Clifton, T.C. May 1995. (AD A298 562)

This manual provides how-to guidance on use of a prototype database developed by the U.S. Army Research Institute to support short- and long-term effectiveness assessment of training strategies employed by armor and mechanized infantry units of the U.S. Army National Guard. Information is provided on how to create, retrieve, edit, and analyze database files developed through use of the Statistical Package for the Social Sciences for Windows, version 6.1. A data element dictionary is also provided wherein the contents of each data file are described.

RP 96-01 An unaided night vision instructional program for ground forces, Dyer, J L.; Mittelman, M.D. October 1995. (AD A304 339)

The report documents an instructional program on unaided night vision skills and knowledge critical to all ground force night operations. The Program was developed jointly by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), the Naval

Aerospace Medical Research Laboratory, and the Naval Aerospace and Operational Medical Institute. A series of experiments conducted by ARI showed the program to be effective with both experienced soldiers and Infantry trainees. The program is presented in the dark using neutral density filters on 35-mm slides to allow individuals to dark adapt over a 30- to 45-minute instructional period. Demonstrations show what happens to vision at night as well as techniques to reduce visual illusions and other Problems encountered at night. The report contains the instructional guide for the Program, a separate summary of the Program content, and a job aid to remind soldiers of critical night vision concepts and guidelines regarding use of their eyes during night exercises.

RP 96-02 Annotated bibliography of training technologies and methods for teaching the use of advanced technology, Collins, J.W. Throne, M.H. January 1996. (AD A308831)

This research product addresses the recent literature on advanced training technologies that are especially suited to training the use of high-technology systems. A review of 92 recent articles was performed. The articles are organized into three sections depending upon their origin: military, education, or business. The overall majority of the articles agree that computer-based training is the most significant current training technology available.

RP 96-03 Development of a battle staff guide for selected digital information systems, Sanders, W.P.; Elliott, G.S. April 1996. (AD A309 759)

A prototype job aid titled Battle Staff Guide for Selected Digital Information Systems was produced and evaluated to support the training and job performance requirements of a combined arms battalion task force equipped with digital communications systems. The job aid presents troop-leading procedures task information in a flexible checklist format. While Participating in the Army's Advanced Warfighting Experiment, Focused Dispatch (AWE FD), the battle staff of the U.S. Army Armor Schools 16th Cavalry Regiment, 2nd Battalion, 33rd Armor Task Force (TF 2-33 AR), reviewed the prototype job aid and gave positive support to the development of such materials. Battle staff feedback identified new approaches to command and control that take advantage of the advanced capabilities offered by the new digital systems to allow for rapid and dispersed operations.

RP 96-04 The Army command and control evaluation system (ACCES), Halpin, S. M. August 1996. (AD A317 213)

This report provides an overview of the Army Command and Control Evaluation System (ACCES) theory and methodology. ACCES was initially developed by Defense Systems, Inc. in the period October 1986 to January 1990 under the direction of the Fort Leavenworth, KS, Research Unit of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). In the spring of 1990, ARI awarded two follow-up contracts: one to Quantum Research International for support in conducting ACCES applications and the second to Evidence Based Research, Inc. for specific required enhancements to the ACCES system. Both contracts expired near the end of 1993. This report provides a description of ACCES Version 93 and is current as of the end of December 1993. No further modification of ACCES methodology is

planned at this time. A Companion publication, "The Army Command and Control Evaluation System (ACCES) 93 Documentation," ARI Research Report 95-09, provides a detailed discussion of the mechanics of implementing ACCES.

RP 96-05 SIMNET unit performance assessment system (UPAS). Version 2.5 user's guide, Meliza, L. L.; Tan, S. C. August 1996. (AD A318 046)

The networking of combat vehicle simulators in SIMNET is a method of collective training that supplements field exercises. This report offers guidance for using the PC-based Unit Performance Assessment System (UPAS) to collect and analyze data from SIMNET exercises. This report is an updated version of ARI Research Product 92-02 accomplished to reflect the addition of new features and capabilities during the application of UPAS as a training research tool. Additions to the UPAS include: company-level versions of existing platoon-level displays; a new type of map display (the Fire Fight) to better analyze how fires are distributed over space; a Fire Fight display; an After Action Review (AAR) Presentation Manager to capture, add comments to, and sequence data displays for an AAR or electronic Take Home Package; a mouse interface; the option to display an aggregate icon at platoon level; and the capability to display line-of-sight information.

RP 96-06 A guide for early embedded training decisions. Second edition, Witmer, B. G.; Knerr, B. W. August 1996. (AD A315 823)

Embedded training (ET) is training built into or added to a weapons system. Although Army policy requires training developers to consider ET before other training options, effective implementation of this policy has been hampered by the lack of specific features to determine whether training should be embedded or not. This report provides a set of guidelines--in the form of detailed decision flowcharts--to assist training developers and engineers in malting early ET decisions.

RP 96-07 Task analysis for coordinate, synchronize, and integrate fire support as accomplished by a brigade combat team, McIlroy, B. J.; Mullen, W. J III; Dressel, D. J.; Moses, R L. August 1996. (AD A314 584)

This research product provides a detailed description of fire support as accomplished by a brigade combat team. It is one in a series that describes the tasks, performers, and outcomes for the combat function of coordinate, synchronize, and integrate fire support. Assessment criteria are provided for reports in this series except for the current one at brigade level. Other reports focus on fire support at the echelons of division, corps, and to related functions at corps as a joint task force.

RP 96-08 The development of structured simulation-based training for digital forces: Initial battalion staff-level efforts, Winsch, B. J.; Garth, T H.; Ainslie, P. M.; Castleberry, J. August 1996. (AD A318 289)

New command, control, and communication technologies will affect soldier training requirements. Emerging training requirements for Army leaders include competency on a wider variety of tasks, the ability to exploit the capabilities of new technologies, and a clear understanding of digital tactics, techniques, and procedures. Examining these new training requirements now ensures Force XXI's readiness to face the challenges of the 21st century. The current effort, Simulation-Based Multiechelon Training Program for Armor Units-Digital (SIMUTA-D), contributes a first step toward solving some of the key training challenges faced by Force MU. The SIMUTA-D program features Movement to Contact, Deliberate Attack, and Defense in Sector training support packages (TSPs) that support execution-focused, battalion task force staff training for the digitally equipped battlefield. An observer/controller team and an active unit participated in a series of pilot trials and a formative evaluation of the TSPs. This report focuses on SIMUTA-D's TSP development methods and the formative evaluation data. The data provide a host of lessons learned that should be of interest to future training developers. Suggestions for future training program development are offered.

RP 96-09 Brigade Commander's battle staff handbook, Andre, C. P.; Valentine, R J. August 1996. (AD A319 608)

Research conducted by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) Infantry Forces Research Unit show that functional area training is typically not available to prepare the maneuver branch officers for their assigned staff duties. The Brigade Commander's Battle Staff Handbook, presented here, offers a partial solution to this problem. This handbook provides commanders with a convenient source of battle staff specific content for immediate use by their staff. This product served as the front-end analysis and task list for the Battle Staff Training System (BSTS), a CD-ROM program designed to meet the needs of the Reserve Component units. This product, as part of a larger project on staff training, was sponsored by the Defense Advanced Research Projects Agency (DARPA) as a part of the Simulation in Training for Advanced Readiness (SIMITAR) advanced technology demonstration. The work was largely performed by BDM Federal, Inc. under contract to ARI.

RP 96-10 Individual combatant simulation system (ICSS) assessment plan, Knerr, R W. August 1996. (AD A318 070)

The objectives of the ICSS program were to: insert the individual combatant into the Distributed Interactive Simulation (DIS) compliant virtual environment; develop a more accurate representation of hostile combatants, neutrals, and friendlies in a dynamic synthetic environment; and develop a more realistic human interface. This report describes the assessment plan for the ICSS Included are descriptions of the objectives of the ICSS program, its components, the objectives of the ICSS assessment, and the scope of the assessment (in terms of the ICSS tasks that are included). Time constraints and assessment approaches are presented. The approach for the development of lessons learned, which applies to all ICSS tasks, is then described. Each ICSS task (and where appropriate, subtasks) is described along with the assessment issues, general assessment approach, type of approach, scenario, performance measures, and tasks necessary to conduct the assessment. The computer resources and

requirements and resources of the participating organizations are then presented. Finally, a labor and cost estimate is provided for each task.

RP 96-11 Battalion battle staff training system (BN-BSTS) program design/critical tasks, Andre, C. R.; Salter, M. S. August 1996. (AD A318 680)

This report is a research byproduct that documents the front-end analysis for development of the Battalion Battle Staff Training System (BN-BSTS). BN-BSTS, a set of functional area training packages for battalion-level staff officers, is a combination of text and computer-based instruction (CBI). Sponsored by the Defense Advanced Research Projects Agency (DARPA), the BN-BSTS was developed for use by the U.S. Army National Guard (ARNG). The prototype BSTS comprised 13 courses for training brigade staff officers in individual functional areas and those tasks required to prepare staffs for collective battle staff tasks. The BST'S program, sponsored under the DARPA program umbrella of Simulation in Training for Advanced Readiness (SIMITAR), is coordinated with three other programs: Simulation-Based Mounted Brigade Training Program (SIMBART), Simulation-Based Multiechelon Training for Armor Units (SIMUTA), and Combat Service Support (CSS) Training System Development for the National Guard.

RP 96-12 Battle staff training system (BSTS) glossary, Andre, C. R.; Salter, M. S, August 1996. (AD A318 681)

This report comprises a glossary of terms as used in development of the Battalion and Brigade Battle Staff Training System (BSTS). BSTS, functional area training packages for staff officers, is a combination of text and computer-based instruction (CBI). Sponsored by the Defense Advanced Research Projects Agency (DARPA), the BSTS was developed for use by the U.S. Army National Guard (ARNG). The prototype BSTS comprised 13 courses for training brigade staff officers in individual functional areas and those tasks required to prepare staffs for collective battle staff tasks. The glossary presents the working definitions of terms used in these programs. The BSTS program, sponsored under the DARPA program umbrella of Simulation in Training for Advanced Readiness (SIMITAR), is coordinated with three other programs: Simulation-Based Mounted Brigade Training Program (SIMBART), Simulation Based Multiechelon Training for Armor Units (SIMUTA), and Combat Service Support (CSS) Training System Development for the National Guard.

RP 96-13 Brigade battle staff training system (BDE/BSTS) program design/critical tasks, Andre, C. R; Salter, M.S. September 1996. (AD A318 680)

This report is a research byproduct that documents the front-end analysis for development of the Brigade Battle Staff Training System (BDE-BSTS). BDE-BSTS, a set of functional area training packages for brigade-level staff officers, is a combination of text and computer based instruction (CBI). Sponsored by the Defense Advanced Research Projects Agency (DARPA), the BDE-BSTS was developed for use by the U.S Army National Guard (ARNG). The prototype BSTS comprised 13 courses for training brigade staff officers in individual functional areas and those tasks required to prepare staffs for collective battle staff

tasks. The glossary presents the working definitions of terms used in these programs. The BSTS program, sponsored under the DARPA program umbrella of Simulation in Training for Advanced Readiness (SIMITAR), is Combat Service Support (CSS) Training System Development for the National Guard.

RP 97-01 Air Warrior Baseline Evaluation, Volume I Summary, Wright, R.H.; Hanson, R.R.; Couch, M.E. October 1996. (AD A320 909)

Air Warrior is a U.S. Army program that has been initiated to improve the fighting capabilities of helicopter crews in contaminated combat environments. The Air Warrior baseline simulations were conducted to identify and quantify the effects on aircrew mission and task performance of wearing the current MOPP IV protective and survival ensemble. Differences in performance and workload between the MOPP IV ensemble and normal flying gear were obtained for AH-64 crews flying night missions and performing a set of daylight maneuvers and tasks. The MOPP IV ensemble was found to cause major increases in workload and reduce performance on numerous aircrew tasks. Specific effects of the MOPP IV ensemble on aircrew discomfort, pain, and task performance were obtained through detailed debriefings.

RP 97-02 Virtual Training Program Orientation Guide, Burnside, B.L.; Leppert, M.A.; Myers, W.E. October 1997. (AD A322 045)

This Orientation Guide acquaints leaders of armor, mechanized infantry, and cavalry units with the Virtual Training Program (VTP). Additionally, it provides leaders with sufficient information to enable them, in coordination with the Fort Knox VTP Observer/Controller Team, to decide on the type of simulation to use and the echelon and level of training to conduct during a training rotation at Fort Knox or other sites having VTP capabilities.

RP 97-03 Recommendations for Planning and Conducting Multi-Service Tactical Training with Distributed Interactive Simulation Technology, Bell, H.H.; Dwyer, D.J.; Love, J.F.; Meliza, L.L.; Mirabella, A.; Moses, F.L. February 1997. (AD A328 480)

This report recommends practices for planning and conducting tactical training using Distributed Interactive Simulation (DIS) technology with multi-Service groups. Groups are geographically separated. The recommendations presented are based on the experience gained from the Multi-Service Distributed Training Testbed (MDT2)--a testbed designed to develop training opportunities and tools to increase the utility of multi-Service training. MDT2 is a realistic, although synthetic, environment for training with the flexibility to support planning, preparation, execution, and feedback for the multi-Service Close Air Support (CAS) mission. This report combines the knowledge from MDT2-CAS with the authors' knowledge of training into recommendations about how to train best with DIS technology.

RP 97-04 Task Analysis of a Mobility and Survivability Critical Combat Function as Accomplished by a Brigade, Jarrett, P.A. December 1996. (AD A322 609)

This research product provides a detailed description and task analysis of one of the seven Critical Combat Functions (CCF) that comprise the mobility and survivability (M&S) Battlefield Operating System (BOS). This function is CCF 21, Overcome Obstacles. The task descriptions and analyses pertain to brigade combat teams and their interdependent relationships, both internally to the M&S BOS and externally with other BOSs (e.g., brigade staff, engineer battalion, military intelligence, and fire support). These analyses can be used by different functional specialists (e.g., training, combat, and force developers). They will be especially of value where organizational interrelationships need to be considered in issues concerning combined arms integration, iteration, and synchronization. For example, these analyses provide information useful to training developers concerned with improving the proficiency with which engineering activities are coordinated and then integrated into combat mission planning, preparation, and execution.

RP 97-05 Orientation Guide for the Simulation-Based Multiechelon Training Program for Armor Units-Digital, Winsch, B.J.; Garth, T.H.; Lewis, J.M., Castleberry J.D. January 1997. (AD A328 688)

New command, control, and communication technologies will affect soldier training requirements. Emerging training requirements for Army leaders include: (a) competency on a wider variety of tasks, (b) the ability to exploit the capabilities of new technologies, and (c) a clear understanding of digital tactics, techniques, and procedures. The current effort, Simulation-Based Multiechelon Training Program for Armor Units - Digital (SIMUTA-D), contributes a first step toward solving some of the key training challenges faced by Force XXI. The SIMUTA-D program features Movement to Contact, Deliberate Attack, and Defense in Sector training support packages which support execution-focused, battalion task force staff training for the digitally-equipped battlefield. This orientation guide provides the training unit with sufficient information to prepare to conduct training for the digital battlefield in a virtual (SIMulation NETworking [SIMNET]) or constructive (Janus) environment. In addition, it serves as a quick reference that briefly describes the essential duties and responsibilities of the training unit and an observer/controller team.

RP 97-06 Special Forces Assessment and Selection (SFAS) Course: Similarities and Differences of Candidates Based on Phase Performance, Alderks, C.E. January 1997. (AD B221 692)

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and the U.S. Army John F. Kennedy Special Warfare Center and School (USAJFKSWCS) are pursuing a joint effort to better select candidates into Special Forces. All volunteers are assessed in the Special Forces Assessment and Selection (SFAS) course and only those who successfully complete the course are admitted to Special Forces training. The SFAS course is in three phases-prerequisite tests, Phase I, and Phase II. Candidates receive ratings and continue or are dropped at each of the phases. This report follows candidates (by group) through SFAS based on their performance ratings (satisfactory, questionable, unsatisfactory) for many of the exercises in each of the phases. Examples of questions answered include "If a candidate is unsatisfactory during Phase 1, how does he perform during Phase II?" or "Is a candidate who is

satisfactory during Phase I also satisfactory during Phase II?" and "Are there any events that better predict satisfactory (or selected) status?" An understanding of how soldiers progress successfully through SFAS can help decision-makers evaluate and fine-tune the course.

RP 97-07 Methods for Training Cognitive Skills in Battlefield Situation Assessment, Freeman, J.T.; Cohen, M.S. January 1997. (AD A323 565)

Situation assessment provides the basis for decisions by battlefield commanders and their staff during both planning and operations. In previous work, we developed a framework for battlefield commanders' situation assessment from interviews with active duty command staff and from published work in cognitive psychology. The present report describes methods for training cognitive skills in situation assessment based on that framework. Two training methods have been developed, both of which focus on metacognitive skills involved in verifying and improving assessments and plans. The first method helps officers find and assess the reliability of hidden assumptions. It includes a devil's advocate technique that forces officers to imagine that their assessment is wrong and to explain why, as well as techniques for handling potential problems that are found. The second method helps officers find and resolve conflicting evidence. It includes techniques for trying to explain the conflicting data in terms of the current assessment, evaluating the plausibility of the explanations, and generating alternative assessments. The training techniques have been experimentally tested with active-duty officers, and the results of that testing are described in a companion report. The training methods appear to have wide potential applicability in military as well as nonmilitary contexts.

RP 97-08 Analysis of the Function to Coordinate, Synchronize, and Integrate Fire Support as Accomplished by a Division, Fields, H.T. Jr., Mullen, W.J. III; Moses, F. L. February 1997. (AD A328 275)

This Research Product provides a detailed description of fire support as accomplished by a Division. It is one in a series that describes the tasks, performers, and outcomes for the combat function of Coordinate, Synchronize, and Integrate Fire Support. Assessment criteria are provided for reports in this series except for the one at Brigade level. Reports focus on fire support at the echelons of Brigade, Division, and Corps and to related functions at Corps as a Joint Task Force. This series of Research Products provides resource documents for military and civilian trainers to assist in the design and evaluation of single service and joint training. Doctrinal writers may use these descriptions as a basis for modifying current doctrine or for the formulation of future doctrine.

RP 97-09 Analysis of the Function to Coordinate, Synchronize, and Integrate Fire Support as Accomplished by a Corps, Taylor, H.G.; Mullen, W.J. III, Moses, F L. February 1997. (AD A328 271)

This Research Product provides a detailed description of fire support as accomplished by a Corps. It is one in a series that describes the tasks, performers, and outcomes for the combat function of Coordinate, Synchronize, and Integrate Fire Support. Assessment criteria are provided for reports in this series except for the one at Brigade level. Reports focus on fire

support at the echelons of Brigade, Division, and Corps and to related functions at Corps as a Joint Task Force. This series of Research Products provides resource documents for military and civilian trainers to assist in the design and evaluation of single service and joint training. Doctrinal writers may use these descriptions as a basis for modifying current doctrine or for the formulation of future doctrine.

RP 97-10 Analysis of the Function to Coordinate, Synchronize, and Integrate Fire Support as Accomplished by an Army Corps Acting as a Joint Task Force, Fields, H.T. Jr.; Taylor, H.G.; Moore, B.R.; Mullen, W.J. III; Moses, FL. February 1997. (AD A328 260)

This Research Product provides a detailed description of joint fires as accomplished by an Army Corps acting as a Joint Task Force. It is one in a series that describes the tasks, performers, and outcomes for the combat function of Coordinate, Synchronize, and Integrate Fire Support. Assessment criteria are provided for reports in this series except for the one at Brigade level. Reports focus on fire support at the echelons of Brigade, Division, and Corps and to related functions at Corps as a Joint Task Force. This series of Research Products provides resource documents for military and civilian trainers to assist in the design and evaluation of single service and joint training. Doctrinal writers may use these descriptions as a basis for modifying current doctrine or for the formulation of future doctrine.

RP 97-11 1995 Special Forces Assessment & Selection Database User's Guide and Codebook, Alderks, C.E. February 1997. (AD B227 627)

This report describes the development and contents of the 1995 Special Forces Assessment & Selection (SFAS) Database. The information in the database was obtained from the U.S. Army John R Kennedy Special Warfare Center and School (USAJFKSWCS). Variables include basic demographics, Intelligence and Aptitude Scores, SFAS Outcome Scores, Prerequisite and Phase I Timed Events and Ratings, and Phase II Team Performance Events. This database is organized by individual and class. This database is useful if the user's objective is to analyze data within or across classes. It also provides the capability for longitudinal research and is designed to track students over time and across classes. When combined with the Special Forces Qualification Course (SFQC) Database, it can be used to track individuals through the Special Forces selection and training process. The database was developed to answer questions of immediate practical importance to the sponsor (USAJFKSWCS).

RP 97-12 Cumulative Special Forces Assessment & Selection Database User's Guide and Codebook, Alderks, C.E. March 1997. (AD B227 507)

This report describes the development and contents of the Cumulative Special Forces Assessment & Selection (SFAS) Database. The information in the database was obtained from the U.S. Army John R Kennedy Special Warfare Center and School (USAJFKSWCS). Variables include basic demographics, Intelligence and Aptitude Scores, SFAS Outcome Scores, Prerequisite and Phase I Timed Events and Ratings, and Phase II Team Performance Events. This database is organized by individual, class, and fiscal year. This database is useful if the user's objective is to analyze data within or across classes and fiscal years. It also provides the

capability for longitudinal research, and when combined with the Special Forces Qualification Course (SFQC) Database, can be used to track individuals over the Special Forces selection and training process. The database was developed to answer questions of immediate practical importance to the sponsor (USAJFKSWCS) and to support the U.S. Army Research Institute for the Behavioral and Social Sciences' long-term Special Forces research program.

RP 97-13 Task Analyses of Two Combat Service Support Critical combat Functions as Accomplished by a Brigade, Huffman, J.A.; Finley, D.L. June 1997. (AD A328 907)

This research product presents task analyses of 2 of the 12 critical combat functions (CCFs) that compose the Combat Service Support (CSS) Battlefield Operating System (BOS). These are: CCF 28, Provide Transport Services; and CCF 29, Conduct Supply Operations. These analyses are required by the brigade to achieve the outcomes necessary to provide supplies and transportation for a heavy brigade in compliance with the commander's concept and intent. These analyses identify the critical tasks and subtasks undertaken by the brigade commander, his staff, and the brigade's subordinate and supporting commanders and staffs. They reflect those activities performed during the planning, preparation, and execution phases of the battle. These analyses can be used by different functional specialists (e.g., training, combat and force developers). They will be especially of value where organizational interrelationships need to be considered in issues concerning combined arms integration, interaction, and synchronization. For example, the analyses provide information useful to training developers concerned with improving the proficiency with which transport and supply activities are coordinated and then integrated into combat mission planning, preparation, and execution.

RP 97-14 Guide to Development of Structured Simulation-Based Training, Campbell, C. H.; Deter, D.E. June 1997. (AD A328 666)

The Army Research Institute for the Behavioral and Social Sciences (ARI) and the Force XXI Training Program have sponsored the development of a structured simulation-based training program for selected staffs of conventional mounted brigades. The development effort, entitled the *Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation* (and known as COBRAS) resulted in construction of training support packages (TSPs) for large-scale exercises and for small-group vignette. Development of the scenario and all TSP materials followed the guidance found in the *Methodology for Development of Structured Simulation-Based Training,* published by ARI in 1995. The *Report on the Methodology for Development of Structured Simulation-Based Training Programs e*xpands the guidance found in the original methodology, based on experience in the COBRAS program. This guide contains additional examples and warnings, and more in-depth coverage of TSP construction and formative evaluations. It is intended for use by training designers and developers, as well as training, program reviewers and proponents.

RP 97-15 Training Computer Skills for the Future Battlefield: A Review and Annotated Bibliography, Throne, M. H.; Lickteig, C.W August 1997. (AD A337 314)

As the Army moves toward a digital battlefield, the nation's defense will become reliant on the computer skills of its leaders, soldiers, and civilians. To embody this future force, Army training must successfully address the acquisition, retention, and transfer of computer skills. As a first step toward this goal, this research product reviews the literature concerning the acquisition, retention, and transfer of computer-based skills. A review of 76 articles examining the training domains of programming, software, simulation, and gaming ability was performed. General conclusions for each training area (acquisition, retention, and transfer) are presented. In general, the research does not build on previous findings in the area. In addition, many areas, such as the long-term retention of computer skills and individual difference variables, remain to be explored.

RP 97-16 A Description of Multimedia Presentation of COBRAS Vignette Training Support Package Information, Hoffman, R.G. September 1997. (AD A336 703)

The purpose of this paper is to describe a multimedia presentation of the background information needed to participate in a COBRAS vignette staff training exercise. Vignette exercises provide opportunities for brigade staffs to practice selected aspects of the planning and execution of heavy armored brigade missions. Because each exercise targets a different staff process, participants must become acquainted with the background scenario that provides the context for the activities they will practice. Training materials originally developed for the presentation of this background information were paper-based. To the detriment of the exercise, participants have had a tendency to avoid reading these materials. Multimedia may provide a more stimulating and efficient delivery method, but only if it is well designed. The outline of a multimedia presentation for one of the vignettes is developed using guidelines concerning the structure of the information being presented, sensory modalities suited to types of information, and principles of intrinsic motivation. The paper recommends testing the effectiveness of multimedia for delivering this type of training information.

RP98-01 Take Active Air Defense Measures (Battlefield Function 16) as Accomplished by a Heavy Brigade with a Subordinate Air Defense Artillery Battery Volume 1: Function Analysis. Whitley, A., Mullen , W. J. III, and Quinkert, K.A. October 1997. (AD A342576)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery (ADA) battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the

FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for the supporting ADA battery.

RP98-02 Take Active Air Defense Measures (Battlefield Function 16) as Accomplished By a Heavy Brigade with a Subordinate Air Defense Artillery Battery Volume 2: Assessment Package, Mullen, W. J. 111. Whitley, A. and Kemper, T. R. December 1997. (AD A342575)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery (ADA) battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the Fas, a user's guide, and assessment packages for the BFs. This report provides the assessment package for the supporting ADA battery.

RP98-03 Plan for Combat Operations (Battlefield Function 18) as Accomplished by a Heavy Brigade Volume 1: Function Analysis, Harrison, K.E. & Bartkoski, T.P. January 1998. (AD A344154)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF 18 as performed by a heavy brigade headquarters.

RP98-04 Plan for Combat Operations (Battlefield Function 18) as Accomplished by a Heavy Brigade Volume 2: Assessment Package, Mullen, W.J. III, Harrison, K.E., Kemper, T.R., Bartkoski, T.P. December 1997. (AD A342482)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF18 as performed by a heavy brigade headquarters.

RP98-05 Direct and Lead Units During Preparation for the Battle (Battlefield Function 19) as Accomplished by a Heavy Brigade Volume 1: Function Analysis, Gass, J. , Harrison, K.E., Finley, D.L. & Quinkert, K.A. December 1997 (AD A343032)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF19 as performed by a heavy brigade headquarters.

RP98-06 Direct and Lead Units During Preparation for the Battle (Battlefield Function 19) as Accomplished by a Heavy Brigade Volume 2: Assessment Package, Mullen, W.J. III, Gass, J., Harrison, K.E., Harrison, P.E., Huffman, J.A. December 1997. (AD A343031)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF19 as performed by a heavy brigade headquarters.

RP98-07 Direct and Lead Units in Execution of Battle (Battlefield Function 20) as Accomplished by a Heavy Brigade Volume 1: Function Analysis, Harrison, K.E., Bartkoski, T.P., Getz, C. January 1998. (AD A344592)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF20 as performed by a heavy brigade headquarters.

RP98-08 Direct and Lead Units in Execution of Battle (Battlefield Function 20) as Accomplished by a Heavy Brigade Volume 2: Assessment Package, Mullen, W.J. III, Harrison, K.E., Keesling, J.W., Bartkoski, T.P., Getz, C. December 1997. (AD A342469)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF 20 as performed by a heavy brigade headquarters.

RP98-09 Plan for Combat Operations (Battlefield Function 18) as Accomplished by an Engineer Battalion Supporting a Heavy Brigade Volume 1: Function Analysis, Anderson, M.S., Clagg, R.A. & Quinkert, K.A. December 1997. (AD A342405)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF 18 as performed by the engineer battalion supporting a heavy brigade.

RP98-10 Plan for Combat Operations (Battlefield Function 18) as Accomplished by an Engineer Battalion Supporting a Heavy Brigade Volume 2: Assessment Package, Mullen, W.J. III, Anderson, M.S., Clagg, R.A. & Kemper, T.R. December 1997. (AD A342406)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF 18 as performed by the engineer battalion supporting a heavy brigade.

RP98-11 Direct and Lead Units During Preparation for the Battle (Battlefield Function 19) as Accomplished by an Engineer Battalion Supporting a Heavy Brigade Volume 1: Function Analysis, Clagg, R.A. , Anderson, M.S., & Quinkert, K.A. January 1998. (AD A342464)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF 19 as performed by the engineer battalion supporting a heavy brigade.

RP98-12 Direct and Lead Units During Preparation for the Battle (Battlefield Function 19) as Accomplished by an Engineer Battalion Supporting a Heavy Brigade Volume 2: Assessment Package, Mullen, W.J. III, Anderson, M.S., Clagg, R.A. & Ford, P.J. December 1997. (AD A343716)

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF 19 as performed by the engineer battalion supporting a heavy brigade.

RP98-13 Direct and Lead Units in Execution of Battle (Battlefield Function 20) as Accomplished by an Engineer Battalion Supporting a Heavy Brigade Volume 1: Function Analysis, Anderson, M.S. & Clagg, R.A. January 1998. (AD A343037)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield

functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF20 as performed by the engineer battalion supporting a heavy brigade.

RP98-14 Direct and Lead Units in Execution of Battle (Battlefield Function 20) as Accomplished by an Engineer Battalion Supporting a Heavy Brigade Volume 2: Assessment Package, Mullen, W.J. III, Anderson, M.S., Clagg, R.A. & Keesling, J.A. November 1997. (AD A343716)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF 20 as performed by the engineer battalion supporting a heavy brigade.

RP98-15 Plan for Combat Operations (Battlefield Function 18) Accomplished by a Direct Support Field Artillery Battalion Volume 1: Function Analysis, Elder, R. January 1998. (AD A343311)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment

packages for the BFs. This report provides the FA and user's guide for BF 18 as performed by the direct support field artillery battalion.

RP98-16 Plan for Combat Operations (Battlefield Function 18) as Accomplished by a Direct Support Field Artillery Battalion Volume 2: Assessment Package, Mullen, W.J. III, Elder, R. & Kemper, T.R. January 1998. (AD A342460)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF 18 as performed by the direct support field artillery battalion.

RP98-17 Direct and Lead Units During Preparation for Battle (Battlefield Function 19) as Accomplished by a Direct Support Field Artillery Battalion Volume 1: Function Analysis, Elder, R. January 1998. (AD A343631)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF 19 as performed by the direct support field artillery battalion.

RP98-18 Direct and Lead Units in Preparation for Battle (Battlefield Function 19) as Accomplished by a Direct Support Field Artillery Battalion Volume 2: Assessment Package, Mullen, W.J. III, Elder, R. & Ford, P.J. January 1998. (AD A342558)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training. The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF 19 as performed by the direct support field artillery battalion.

RP98-19 Direct and Lead Units in Execution of Battle (Battlefield Function 20) as Accomplished by a Direct Support Field Artillery Battalion Volume 1: Function Analysis, Elder, R. January 1998. (AD A342457)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF 20 as performed by the direct support field artillery battalion.

RP98-20 Direct and Lead Units in Execution of Battle (Battlefield Function 20) as Accomplished by a Direct Support Field Artillery Battalion Volume 2: Assessment Package, Mullen, W.J. III, Elder, R. & Keesling, J.W. January 1998. (AD A343713)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group

Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF 20 as performed by the direct support field artillery battalion.

RP98-21 Special Forces 1996: A Report from the Field, Diana, M., Zazanis, M.M. & Lappin, M.S. April 28, 1998. (AD B247937)

In the Fall of 1995, the US Army Special Forces Command (AIRBORNE) elected to survey its soldiers regarding their concerns, frustrations, satisfactions, and career intentions in SF. To respond to the USASFC(A) request, researchers developed then administered the Special Forces (SF) Command Field Survey to SF soldiers between March and August of 1996. This report is designed to provide the SF community with candid feedback summarizing both the positive and negative aspects of soldiers' experiences in SF.

Survey results reflected the pride soldiers had in being members of the SF community. Soldiers indicated SF to offer greater opportunities for exercising initiative and autonomy, as well as for professional growth, relative to the conventional Army. Further, soldiers appreciated the high caliber of soldier found among their peers and noted the high level of professionalism and skill among soldiers. Coupled with a passion for travel and experiencing other cultures, the vast majority of soldiers reported their service on an ODA to be one of the best experiences they had ever had. Soldiers also, however, reported several frustrations and concerns in SF. Many reported frustration with the lack of team training time and the seemingly high levels of micromanagement in SF, as well as with the pervasive 'zero defects' mentality that has swept through much of the Armed Forces. Other common concerns included excessive paperwork burdens and the seeming "bureaucratization" of SF.

RP98-22 Plan for Combat Operations (Battlefield Function 18) as Accomplished by a Forward Support Battalion Volume 1: Function Analysis, Whitley, S.H. & Anderson, M. February 1998. (AD A342517)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF 18 as performed by the forward support battalion.

RP98-23 Plan for Combat Operations (Battlefield Function 18) as Accomplished by a Forward Support Battalion Volume 2: Assessment Package, Mullen , W. J. III, Whitley, S., Anderson, M., and Kemper, T.R. February 1998. (AD A342573)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Croup Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF 18 as performed by the forward support battalion.

RP98-24 Direct and Lead Units During Preparation for the Battle (Battlefield Function 19) as Accomplished by a Forward Support Battalion Volume 1: Function Analysis, Whitley, S.H. & Anderson, M. February 1998. (AD A342438).

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through

a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF 19 as performed by the forward support battalion.

RP98-25 Direct and Lead Units During Preparation for the Battle (Battlefield Function 19) as Accomplished by a Forward Support Battalion Volume 2: Assessment Package, Mullen, W.J. III, Whitley, S.H., Anderson, M. & Ford, P.J. January 1998. (AD A342439)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF 19 as performed by the forward support battalion.

RP98-26 Direct and Lead Units in Execution of Battle (Battlefield Function 20) as Accomplished by a Forward Support Battalion Volume 1: Function Analysis, Whitley, S.H. & Anderson, M. February 1998 (AD A343604)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the FA and user's guide for BF 20 as performed by the forward support battalion.

RP98-27 Direct and Lead Units in Execution of Battle (Battlefield Function 20) as Accomplished by a Forward Support Battalion Volume 2: Assessment Package, Mullen, W.J. III, Whitley, S.H., Anderson, M. & Keesling, J.W. January 1998. (AD A343605)

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

The documentation approach was to apply function analysis (FA) techniques for battlefield functions (BFs) in the Command and Control battlefield operating system. Thirteen FAs were developed for the brigade headquarters and four supporting units: direct support field artillery battalion, engineer battalion, forward support battalion, and air defense artillery battery. The FAs were revised through a formative evaluation process that included internal review and successive external reviews by combat training centers, proponent agencies, and a review council representing potential users of the FAs. The final products include the FAs, a user's guide, and assessment packages for the BFs. This report provides the assessment package for BF 20 as performed by the forward support battalion.

RP 98-28 Staff Performance Analysis: A Method for Identifying Brigade Staff Tasks, Ford, L.A. & Campbell, R.C. April 1998 (AD A339237)

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), in coordination with the Directorate of Training and Doctrine Development-Force XXI and Fort Knox, sponsored this research and development effort to design simulation-based training for selected members of conventional mounted brigade staff. Initial analysis of performance requirements in existing documentation revealed that the performance specifications were not sufficiently detailed for brigade battle staffs. Therefore, a systematic performance analysis was conducted. Brigade staff actions were role-played by military subject matter experts (SME). Performance requirements were analyzed for three missions (movement to contact, area defense, and deliberate attack). After each role-play session, SMEs responded to questionnaires regarding their actions and were interviewed extensively by training analysts. Once the information was gathered, it was refined into task statements. The outcome of this process is a list of tasks that identify both individual and interactive performance requirements. The Combined-Arms Operations at Brigade Level, Realistically Achieved Through Simulation

(COBRAS) Brigade Staff Tasks are intended to be used as coaching guides for training observers and as job aids for the training participants.

RP98-29 Combat Leaders' Guide (CLG): Leader Handbook 1997, Salter, M.S. & Martin, M. October 1997 (AD A341343)

The Combat Leaders' Guide (CLG) is a job performance aid for leaders to use as a memory jogger during the realistic combat training like that at the Combat Training Centers or in continuous operations environments. The CLG is a pocket-sized, quick reference system to be used by trained soldiers at company, platoon or squad level. The CLG helps to overcome the effects of performance decay over the time and during periods of high stress and fatigue. It supports unit readiness by providing a leader with doctrinal, tactical, and technical materials in a quick reference format.

RP98-30 COBRAS Brigade Staff Exercise Orientation Guide, Campbell, C.H., Deter, D.E. & Quinkert, K.A. October 1997 (AD A338741)

This Orientation Guide acquaints leaders of armored and mechanized brigades with the Brigade Staff Exercise that is part of the *Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation (COBRAS) Program.* Additionally, it provides leaders with sufficient information to decide if and how to include this in their unit training program, by providing an overview, the intent, and requirements of the exercise.

RP98-31 Task Analyses of Military Intelligence Critical Combat Functions, Bartkoski, T.P., Harrison, K.E. & Finley, D.L. May 1998 (AD A341290)

This research product consolidates the task analyses of the four battle functions, or critical combat functions (CCFs), which comprise the intelligence Battlefield Operating System (BOS). These analyses cover brigade combat team intelligence processes and essential vertical and horizontal relationships with other organizational elements. The four CCFs are: CCF 1, Conduct Intelligence Planning; CCF 2, Collect Information; CCF 3, Process Information; and CCF 4, Disseminate Intelligence. These CCFs form the basis for the subsequent continuous and concurrent intelligence activities that provide critical and timely intelligence and intelligence products to the brigade commander, brigade staff, higher and adjacent units, and subordinate and supporting elements throughout all battle phases. The task analyses are based on conventional warfare doctrine but also address emerging doctrine related to the assignment of a direct support military intelligence company from the divisional military intelligence battalion in support of the brigade. These analyses can be used by different functional specialists (e.g., training, combat, and force developers). They will be especially of value where organizational interrelationships need to be considered in issues concerning combined arms integration, interaction, and synchronization. For example, the analyses provide information useful to training developers concerned with improving the proficiency with which intelligence activities are coordinated and then integrated into combat planning, preparation, and execution.

The purpose of the overall research program was to document the synchronization required by command and control tasks performed within the armored brigade, to include combat support and combat service support units. The immediate application of the documentation was to support developers of staff training in two related projects: Battle Staff Training System and Staff Group Trainer. The documentation was also intended to assist with the planning and execution of collective training.

RP98-32 Development of Brigade Staff Tasks for the COBRAS II Brigade Staff Exercise, Deter, D.E., Campbell, R.C., Ford, L.A. & Quinkert, K.A. May 1998 (AD A341528)

This research and development effort was to design simulation-based training for selected members of the staff of a conventionally equipped armored brigade. This included a detailed analysis of the performance requirements for the staff members. The resulting products were lists of task statements for the chosen training audience. These task lists support the staff exercise run in the Brigade/Battalion Battle Simulation (BBS) called Combined-Arms Operations at Brigade Level, Realistically Achieved Through Simulation (COBRAS II). They expand the task lists which were a product of an earlier effort--COBRAS I, accounting for additions to the training audience.

RP98-33 The Military Decision-Making Process (MDMP) - A Prototype Training Product, Wampler, R.L., Centric, J. & Salter, M.S. May 1998 (AD A343154)

This report documents the analysis, design, and development of the Military Decision-Making Process (MDMP) - A Prototype Training Product. The MDMP product is a computer-based, stand-alone, training support package to assist individuals and staffs of light infantry brigades in learning to participate in the military decision-making process. The product consists of a compact disk that presents a self-paced course of instruction on how to conduct the MDMP. Doctrinal fundamentals based on FM 101-5, Staff Organization and Operations, serve as the basis. The course also contains numerous tactics, techniques, and procedures (TTP) that will assist staff officers in understanding and mastering their individual skills and their role in the collective process. This program, sponsored by ARI, was coordinated with the JRTC Leader's Training Program.

RP98-34 User's Manual for an Army National Guard (ARNG) Armor and Mechanized Infantry Gunnery Training Assessment Database, Smith, M.D. February 1998 (AD A347235)

This user's manual describes a longitudinal database designed to permit the storage, retrieval, and analyses of gunnery-related data generated within Army National Guard (ARNG) armored and mechanized infantry units. The database was developed as part of an assessment of the Simulation in Training for Advanced Readiness (SIMITAR) time-compressed gunnery training strategy, as implemented in a test ARNG armored brigade (Smith, in publication). It contains gunnery performance measures from this test brigade and from six other enhanced "comparison' brigades where the SIMITAR training strategy was not introduced. These measures were collected from 1993-1997 and include first-run and final, live-fire, Table VIII

gunnery Qualification scores, tank main gun ammunition expenditures, related measures/information needed for assessing the impact of different training strategy interventions, and space set aside for recording the outcomes of training aids, devices, simulators and simulations (TADSS) usage. The database is configured within a software program known as the Statistical Package for the Social Sciences (SPSS, Version 6.1 for Windows). Its files can be exported in a number of formats, including spreadsheet and database management programs, as well as into a number of other statistical utilities. This user's manual will help ARNG database managers use the SIMITAR database as a convenient repository for gunnery performance and related information and as a resource for future gunnery-related strategy impact investigations.

RP98-35 Train-the-Trainer Video on the Deliberate Night Attack, Dyer, Jean L. February 1998. (AD A347089)

This report summarizes a two-part video on preparing leaders to train their subordinate leaders and units for the platoon deliberate night attack as part of a rifle company. It integrates training principles dispersed throughout training and doctrine literature and Infantry leader courses, and it shares lessons learned on training for night operations from the Joint Readiness Training Center and from experienced military leaders. Night and day photography illustrate the training sequence needed to master the individual and buddy team skills, battle drills, and situational training exercises that support the night attack. Training with night equipment, the multiple integrated laser engagement system (MILES), and a realistic opposing force are stressed, as is leader planning and techniques to maximize training time. The video culminates with night attack training with MILES during the day and then at night, followed by live-fire during the day and then at night The video was shot at Ft Bragg, NC with soldiers and leaders from the 82nd Airborne Division. The photography was taken by the Marine Corps Combat Camera Unit.

RP98-36 The Brigade Battle Captain - A Prototype Training Product, Richard L. Wampler (BDM), James Centric (BDM), and Margaret S. Salter (ARI). (AD A347093)

This report documents the analysis, design, and development of a prototype training product for the Brigade Battle Captain. The product is a computer-based, stand-alone, training support package to assist individual officers and noncommissioned officers in infantry brigades in learning to perform their duties as Battle Captains. The product consists of a compact disk that presents a self-paced course of instruction on the roles and responsibilities of the Battle Captain. Lessons learned from observing and evaluating unit training exercises at the combat training centers (CTCs) serve as the basis for some content. The course also contains numerous tactics, techniques, and procedures and job aids that will assist Battle Captains in understanding and mastering their individual skills and their role in the collective process.

RP98-37 A Procedure for Development of Structured Vignette Training Exercises for Small Groups, Campbell C. H., Ford, L. A.. Campbell, R.C.and Quinkert, K.A. July 1998. (AD A350021)

This research product presents a procedure that can be followed to develop small group focused training exercises. It is a specific application of the methodology contained in the *Guide to Development of Structured Simulation-Based Training,* published by ARI in 1997. Both that guide and this product are based on work performed under the auspices of the Army Research Institute (ARI) and the Force XXI Training Program. The development effort, entitled *Combined Arms Operations at Brigade Level, Realistically Achieved through Simulation* (known as COBRAS), resulted in construction of training support packages (TSPS) for large-scale exercises and for small group vignettes. This product contains examples and explanations that specifically address the construction and evaluation of small group structured exercises. It addresses the use of simulation (live, virtual, and constructive) and discusses the advantages and disadvantages of the uses of simulation for small group exercises.

RP98-38 A Catalog of U.S. Army Research Institute Products Developed From 1985-1998 for the Reserve Component, Hagman, J. D. and Phelps, R. H.. August 1998. (AD A354167)

This report provides a catalog of selected research and development (R&D) products produced between 1985-1998 by the U.S. Army Research Institute (ARI) for the Reserve Component (RC) (i.e., Army National Guard and Reserve). The catalog contains seven chapters. The first describes ARI and its mission, and then the RC, its organization and strength, and how its operational environment differs from that of the Active Component (AC). The next two describe products that use training aids, devices, simulators, and simulations (TADSS) to overcome individual/crew (Chapter 2) and unit/battle staff (Chapter 3) training time constraints. Chapter 4 talks about products designed to bring geographically dispersed soldiers closer together via distance learning. Chapter 5 describes the results of our efforts to understand and predict RC soldier attrition. Chapter 6 tells what we know about RC soldiers' reactions to being called up for deployment and the feasibility of using a composite AC/RC unit for peacekeeping missions. The final chapter concludes with what we think is the payoff from the products described. The catalog's product summaries include why, how, and with/for whom work was done, what was found/developed, what the conclusions/implications are, and where more information can be found. In doing so, we hope to reveal not only what ARI has done up until now, but also the scope of what it is capable of doing in the future, to support RC R&D product needs of the 21st Century.

RP99-01 A Guide to Standardizing After Action Review (AAR) Aids, Meliza, L.L. November 1998. (AD A359843)

The After Action Review (AAR) is an interactive discussion conducted following collective training exercises to help units decide what happened, why it happened, and how to improve future performance. AAR aids can be employed to refresh memories regarding exercise events, provide new perspectives about exercise events, convince participants of the existence of performance problems, stimulate participation in the AAR process, and document the outcomes of the AAR. The AAR process is intended to apply in live, virtual, constructive, or mixed environments. The Standard Army AAR System (STAARS) concept includes the use of standardized AAR products/aids that can be used across training environments. This guide

clarifies the concept of AAR aid standardization, describes the substantial benefits to be gained by standardization, describes general types of AAR aids, discusses the utility of each type of aid, and presents a technique for defining a standardized set of AAR aids for a specific unit type and echelon.

RP99-02
Number not used.

RP99-03 Development of the COBRAS III Performance Objectives for the Brigade and Battalion Staff Exercise, Jenkins, S.N., Graves, C.R., Deter, D.E. and Quinkert, K.A. April 1999. (AD A364558)

This research and development effort, called Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation III (COBRAS III), designed simulation-based, structured training for the staffs of the conventionally-equipped brigade combat team (BCT). The effort included designing a progressive approach to presenting and utilizing training objectives. The resulting product was a set of "performance objectives" that provides techniques and procedures for command and staff performance. The performance objectives resulted from and support the purpose of the training, which is to facilitate BCT preparation for combat training center rotations and deployment. The performance objective concept was an extension of the task analysis work conducted during the two preceding projects – COBRAS I and COBRAS II.

RP99-04 Joint Targeting Planning Training Guide, Love, J.F. December 1998. (AD A359943)

This guide resulted from an effort to develop a new approach to assessment and diagnostic training feedback in joint training. The guide resulted from a front-end analysis of joint targeting for an air campaign planning simulation. The analysis generated detailed training objectives, measurement instruments, and self-assessment procedures for each objective. For each phase of the joint targeting cycle, inputs, behavioral processes, and products were specified and incorporated in measurement tools. The measures were developmentally applied during Blue Flag 97-1. Blue Flag is a recurring cycle of air campaign planning exercises, managed by a numbered air force. Lessons learned from the application were combined with comments for Blue Flag participants to produce this joint training guide in its current form.

RP99-05 COBRAS Multiechelon Brigade and Battalion Staff Exercise Orientation Guide, Deter, D.E., Allen, J.D., and Quinkert, K.A. December 1998. (AD A359247)

This Orientation Guide acquaints leaders of armored and mechanized brigades with the Brigade and Battalion Staff Exercise that is part of the Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation (COBRAS) Program. It provides leaders with information to decide if and how to include this in their unit training program, by providing an overview, the intent, and requirements of the exercise. Additionally, it provides others interested in multiechelon simulation-based training with a description of the program, the performance objectives, and the implementation resources.

RP99-06
Number not used.

RP99-07 Tacit Knowledge for Military Leaders: Platoon Leader Questionnaire, Hedlund, J., Williams, W.M., Horvath, J.A., Forsythe, G.B., Snook, S., Wattendorf, J., McNally, J.A., Sweeney, P.J., Bullis, R.C. Dennis, M. & Sternberg, R.J. March 1999. (AD A362347).

Tacit knowledge is defined as knowledge grounded in experience, intimately related to action, and not well supported by formal training and doctrine. Tacit knowledge of leadership used by Army officers at three different levels of command have been identified, assessed, and developed into assessment questionnaires for each level. The questionnaires have been construct validated and proven to predict certain leadership effectiveness ratings at each level and to do so better than measures of verbal reasoning ability, tacit knowledge for business managers, or experience. This product contains the leadership tacit knowledge questionnaire for platoon leaders. Instructions are given for administering and scoring the questionnaire and recommended applications are described. The document begins with a brief summary of the development and validation of the questionnaire.

RP99-08 Tacit Knowledge for Military Leaders: Company Commander Questionnaire, Hedlund, J., Williams, W.M., Horvath, J.A., Forsythe, G.B., Snook, S., Wattendorf, J., McNally, J.A., Sweeney, P.J., Bullis, R.C., Dennis, M. & Sternberg, R.J. March 1999. (AD A362346)

Tacit knowledge is defined as knowledge grounded in experience, intimately related to action, and not well supported by formal training and doctrine. Tacit knowledge of leadership used by Army officers at three different levels of command have been identified, assessed, and developed into assessment questionnaires for each level. The questionnaires have been construct validated and proven to predict certain leadership effectiveness ratings at each level and to do so better than measures of verbal reasoning ability, tacit knowledge for business managers, or experience. This product contains the leadership tacit knowledge questionnaire for company commanders. Instructions are given for administering and scoring the questionnaire and recommended applications are described. The document begins with a brief summary of the development and validation of the questionnaire.

RP99-09 Tacit Knowledge for Military Leaders: Battalion Commander Questionnaire, Hedlund, J., Williams, W.M., Horvath, J.A., Forsythe, G.B., Snook, S., Wattendorf, J., McNally, J.A., Sweeney, P.J., Bullis, R.C., Dennis, M. & Sternberg, R.J. March 1999. (AD A352348)

Tacit knowledge is defined as knowledge grounded in experience, intimately related to action, and not well supported by formal training and doctrine. Tacit knowledge of leadership used by Army officers at three different levels of command have been identified, assessed, and developed into assessment questionnaires for each level. The questionnaires have been construct validated and proven to predict certain leadership effectiveness ratings at each level and to do so better than measures of verbal reasoning ability, tacit knowledge for business managers, or experience. This

product contains the leadership tacit knowledge questionnaire for battalion commanders. Instructions are given for administering and scoring the questionnaire and recommended applications are described. The document begins with a brief summary of the development and validation of the questionnaire.

Special Publications

S22 Fort Gordon Field Unit, Fort Gordon, Georgia, 1987-1994, Sanders, M.G. November 1995. (AD A335856)

The Army Research Institute for the Behavioral and Social Sciences (ARI) established a Field Unit at Fort Gordon in March 1987. The Field Unit was established to support the U.S. Army Signal Center and School and Fort Gordon at the suggestion of the Deputy Chief of Staff for Personnel. The need for the Field Unit was identified during a 1986 Signal Functional Area Review in which several manpower, personnel, and training research issues arose. The Signal Corps is the Army's third largest branch. The Army's Long Range Training Plan, at that time, emphasized the requirement to exploit the use of technology in all training activities and systems and increase reliance upon simulation, simulators, and training devices to develop proficiency. The ARI Fort Gordon Field Unit, therefore, had the mission of conducting research to support the development of technology based improvements to Army communications and electronics education and training. A secondary mission was to perform research to address manpower and personnel concerns associated with the design of new Signal systems and the restructuring of existing Military Occupational Specialties.

S 23 Fort Bliss Field Unit, Fort Bliss, Texas, 1974-1994, Army Research Institute. November 1995. (AD A327 550)

In 1974, ARI established a research unit at Fort Bliss, TX to perform training research for the US Army Air Defense Artillery Center and School. In the ensuing 20-year period, this. unit made numerous contributions not only to training in the air defense environment but Army-wide. These contributions included application of the systems approach to a variety of training issues, cost and training effectiveness analysis methodology, and training effectiveness evaluation. This report summarizes the programs and accomplishments of the Fort Bliss Research Unit and provides a reference list of documents reflecting those accomplishments.

S 24 US. Army in peace operations at the dawning of the twenty-first century, Segal, D.R. & Eyre, D.P. May 1996. (AD B220 749)

The international system since the collapse of the Soviet Union and the Warsaw Pact has been characterized by increasing instability and unpredictability, to which the international response has been a wide range of military operation other than war. This report identifies the characteristics and trends in the international system that serves as the environment for these operations. It describes how the nature of peace operations has changed in this environment, and how it might further change in the future. It describes the role that the U.S. Army has played in these operations and the challenges of the Army of understanding these missions and developing doctrine for them, training for and adapting to these missions, and sustaining participation in them. Special attention is paid to the expanding role of the reserves and the implications of peace operations for Army families.

S 25 Recent manpower, personnel and training research products with transfer potential to operational units and organizations, Langenwalter, K. (ed.). July 1996. (AD A321 695)

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) routinely does research on behalf of an Army sponsor, often producing a Product that ARI turns over to that sponsor This report consists of a collection of fact sheets describing some research products recently produced by ARI. It is published in response to requests by operational Army unit and organizations for information that would be useful for their respective missions. The science and technology described are sufficiently robust that their transfer to the operational Army has a high probability of success.

S 26 Principal Scientist Colloquium, Army Research Institute, May 1996. (AD A327703)

In June 1995, ARI held a Principal Scientist Colloquium in which 15 top scientists from 9 ARI research units presented results of their recent in-house research. This report presents the top three papers from the colloquium along with abstracts of au of the other papers. The top three papers are on "Unaided Night Vision Training," "How to Make Decisions About the Effectiveness of Device-Based Training," and "Understanding and Improving Tactical Problem Solving."

S 27 List of U.S. Army Research Institute Research and Technical Publications, October 1, 1994, to September 30,1995, with Author and Subject Index. 1996

S 28 Soldier selection: past, present, and future, Zook, L.M. 1996. (AD A321 806)

This special report is intended for readers who have an interest in military personnel selection and assignment. It describes a long-term research Program-Project A and Building the Career Force-to evaluate and enhance the Army's process of selecting qualified applicants for enlistment and assigning them to the most appropriate job. Appendices depict the enlisted career life cycle and give a short history of military selection.

S 30 National Training Center Research Element, Fort Irwin, California, 1986-1996, Sulzen, R. H. October 1996. (AD A326 056)

The U.S. Army Research Institute for the Behavioral and Social Sciences-National Training Center (ARI-NTC) Research Element mission was to provide research and development support to the NTC Observation Division and the NTC to improve feedback, assess performance, and achieve data related to NTC unit performance. For one decade ARI provided assistance at Fort Irwin, California, to achieve these goals. Ten Observer/Controller (O/C) Guidebooks were developed to assist new O/Cs in the performance of their training and control duties. The Determinants of Effective Unit

Performance project was under-taken to determine the effects of home station training on performance at the NTC. Results indicated that units expending more resources during home station train-up performed better at the NTC. More successful units implemented the Army training management cycle more fully. A study focusing on the opposing forces (OPFOR) at NTC, long recognized as performing well because of their additional training time, identified four practices that could help units preparing for the NTC. Training development support was provided to the Army in Tactical Engagement Simulation. Analysis of a series of battles provided evidence for the benefit of repetitive practice of collective skills.

S 31 Making Decisions in Natural Environments, Klein Associates Inc. February 1997. (AD A327 969)

This report surveys the field of naturalistic decision making (NDM) and shows its potential for supporting the needs of the U.S. Army. The report is written from the perspective of a researcher who has been active in developing models and methods in this new approach. The objective is to show the value of NDM for helping the Army address current challenges, including its use of information technologies, its need to downsize forces, and a change in its expected missions.

S32 Research Pays Off for the Reserve Component: U.S. Army Research Institute Products From 1985-1998, Hagman, J.D. and Phelps, R. H. August 1998. (AD A361095)

This special report summarizes selected research and development (R&D) products produced between 1985 - 1998 by the U.S. Army Research Institute (ARI) for the Army's Reserve Component (RC) (i.e., National Guard and Reserve). The product summaries cover the areas of individual, crew, unit, and battle staff training, distance learning, personnel turbulence, what we know from deployments, and the associated payoff, all keyed to the specific RC operational readiness constraint(s) (e.g., training time, geographical dispersion, personnel turbulence) that each product was designed to address. In providing this information, we hope to reveal not only what ARI has done up until now, but also the scope of what it is capable of doing in the future, to support RC R&D product needs of the 21st Century.

S33 Enhancing U.S. Army Special Forces: Research and Applications, Brooks, J.E. and Zazanis, M.M. October 1997. (AD A339086)

This report summarizes manpower, personnel, and training research conducted by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) in support of U.S. Army Special Forces since 1990. One purpose of the report is to provide a comprehensive summary of the major issues, approaches, and accomplishments of our cooperative research program with the U.S. Army John F. Kennedy Special Warfare Center and School and other key components of the Special Forces community. Another purpose is to offer a broader interpretation of the research in terms of its application and

meaningfulness for the rest of the Army. The report gives a brief overview of research conducted to benefit Special Forces recruitment, selection, assessment, training, and soldiers in the field. At the end of each of these major sections are recommendations for Special Forces and for the Army, based on what we learned from the sections are recommendations and special research. The report concludes with a discussion of future research directions.

S 34 USAREUR Family Support During Operation Joint Endeavor: Summary Report, Bell, D. B.; Bartone, J.; Bartone, PT.; Schumm, WR.; Gade, PA. September 1997. (AD A339 016)

The purpose of this report is to summarize the major findings from a joint Walter Reed Army Institute for Research and U.S. Army Research Institute study of the ability of USAREUR families to adapt to the stresses of Operation Joint Endeavor (OJE) in Bosnia and Hungary. The research which was conducted between April and June 1996 had two parts: an intensive study of four USAREUR communities and a USAREUR-wide spouse survey. The findings and recommendations to USAREUR leaders and staff covered seven issues: (1) spouse support for the mission, (2) the effect of OJE on families, (3) types of families which were a challenge for the service providers, (4) R&R programs, (5) spouse-soldier communications, (6) Family Assistance Center Operations, and (7) spouse ratings of family service agencies. The findings suggest that overall, USAREUR did an excellent job of supporting its families. That is, although the deployment was unpopular and the stress levels were high, the spouses felt that the Army was doing what it could to support them.

S35 1997 In House Researcher Colloquium, Zazanis, M.M., Sterling, B., Lussier, J.W., Pleban, R.J., Young, M.C., Stewart, J.E., Gillis, P. and Sabol, M. A.. February 1998. (AD A361124)

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) held a formal In-House Researcher Colloquium on 20 November 1997 in Alexandria, Virginia. The main purpose of the colloquium was to provide an opportunity for cross unit discussion among ARI's more junior researchers. The eight researchers who presented research findings at the colloquium represented ARI's Armored Forces Research Unit, the Automated Training Methods Research Unit, the Fort Leavenworth Research Unit, the Infantry Forces Research Unit, the Organization and Personnel Resources Research Unit, the Rotary-Wing Aviation Research Unit, the Selection and Assignment Research Unit, and the Simulator Systems Research Unit. Each research topic was specifically selected by the Research Unit Chief as an example of the best of research being performed at the unit. This report provides brief summaries of the research and biographies of the researchers. It also serves as an example of the range of behavioral and social science research being addressed by in-house researchers at ARI as well as of the backgrounds of ARI's research staff.

S36 Leaders' Guide for Contingency Operations: The Human Dimension, Steinberg, A. G. and Foley, D.M. June 1998. (AD A355142)

Interviews and surveys were conducted to examine the attitudes and opinions of soldiers deployed in support of Operation Restore/Continue Hope in Somalia, Operation Uphold Democracy in Haiti, and Operation Joint Endeavor in Bosnia. This guide identifies 13 recurring issues that impacted on soldier attitudes and opinions regarding their deployment experiences. These included: Mission Clarity, Situation Stability, Amount of Threat Lethality, Complexity of the Force, Complexity of the Environment, Specificity of Advanced Preparation, Quality of Leadership, Duration of Deployment, Media Visibility, Range of Job Tasks, Quality of Life, Amount of Family Support, and Quality of Rear Detachment. The issues and their descriptions allow leaders to anticipate issues likely to occur in contingency operations. Recommendations are included with each of the issues. Together, the issues and the recommendations represent leadership lessons learned that can be used both before and during contingency operations.

S37 See You On the Objective: ARI Program NIGHTFIGHTER, Dyer, J.L. and Ford, P. August 1998. (AD B241696)

This report summarizes seven years of work from NIGHTFIGHTER, the Army Research Institute's (ARI) research program on night operations training. The work was guided by extensive analysis of night fighting operations based on surveys from dismounted Infantry units both before and after the Army's own-the-night effort, test results on Army equipment, field observations, and the training and doctrine literature. The analysis showed the need for materials and techniques that train soldiers how to see at night without night vision devices, adjust night vision goggles, fire effectively assisted by night vision goggles, and identify thermal images of vehicles. Experience gained from the analytic work and research in developing these products also reinforced the need for a video on how to train for night operations in an Infantry Battalion. The training products produced from NIGHTFIGHTER and the supporting research are summarized in the report.

S38 Operation Joint Endeavor Research Project Final Report, Foley, D.M. and Steinberg, A.G. July 1998. (AD A355509)

This report (a) provides an overview of the Operation Joint Endeavor (OJE) research project (b) provides a reference list of the research products resulting from the project; and (c) describes ARI's key findings regarding soldier and family attitudes toward their experiences in the OJE deployment. ARI's findings, based on surveys and interviews, identify areas of success and areas needing improvement in Training and Preparation, Assessment of Leaders, Soldier Tasks, Quality of Life, Impact of Deployment. Army Support for Families, and Family Attitudes about OJE. Army planners can use these findings as an additional tool as they continue efforts to cope with the challenges of future deployments.

S39 Staying Sharp: Retention of Military Knowledge and Skills, Wisher, R.A., Sabol, M.A., Ellis, J., and Ellis, K. January 1999. (AD A366825)

This report reviews what is known about forgetting as it applies to military tasks. It includes research conducted by the Army Research Institute as well as related work performed by the Air Force and Navy and leading academic institutions. The report distinguishes the memory for knowledge and skill related to procedural tasks, cognitive tasks, and perceptual-motor tasks. Memory for task knowledge has been demonstrated to be quite good. Memory for cognitive skills has been demonstrated to be quite good. Memory for psychomotor skills varies, depending on whether the task is continuous, such as riding a bicycle, or discrete, such as executing the separate performance steps involved in disassembling a rifle. Throughout the report, figures depict the relative sustainment or decay of a skill as reported in the research literature. A final section concerns the factors that influence the reacquisition of a skill after extended periods of nonuse, as might occur during a mobilization.

S42 Foundations of the After Action Review Process, Morrison, J. E. and Meliza, L.L. July 1999. (AD A368651)

The U.S. Army has adopted the After Action Review (AAR) as its primary method of providing feedback after unit collective training exercises. The AAR is an interactive discussion in which unit members decide what happened, why it happened, and how to improve or sustain collective performance in future exercises. Other services and organizations outside the military are also beginning to employ the AAR as a feedback tool. This report describes the twenty-five year history of AAR research and development and the major behavioral research areas contributing to AAR development and refinement. In addition, this report defines goals for future AAR research.

S43 ARI Survey Programs: An Outside Look, Tourangeau, R., Miller-Steiger, D., Cohen, M., Hanway, S., and Conner, S. July 1999. (AD A369106)

The aim of this project was to assess the quality of ARI's current survey programs, make recommendations for improving them, and to draft regulations that incorporated these recommendations and brought the regulations up to date. Information was gathered about ARI's current attitudinal, command climate, and occupational analysis studies by examining survey documentation and speaking with the staff who carry out the studies. Information was also collected about a number of comparable surveys done by the other services, academic survey organizations, and private firms, and the users of the ARI surveys were queried to assess their satisfaction with ARI's services. ARI was found to use sound methods, comparable to those used by other survey organizations and it achieved similar response rates, and ARI customers expressed a high level of satisfaction. Recommendations are made for continuing enhancement of ARI survey programs.

Study Reports

SR 95-01 Critical factors in the art of battle command, Lussier, J.W.; Sacon, T.F. November 1994. (AD A290 858)

This study report focuses on the reemergence of the importance of the art of battle command and the factors critical to it. First, the conceptualization of battle command is discussed. Included in this discussion are how the concept of battle command differs from the concept of command and control, the consideration of battle command as an art and science, and the place of technology, information, and digitization in the concept of battle command. Drawing on National Training Center studies, traits of leaders, and the differences between experts and novices, the various competencies commonly associated with battle command are analyzed. In keeping with the current BCBL conceptualization of battle command, two fundamental aspects of battle command, leadership and decision-making, are discussed. Research from both the military and non-military sector is presented on leadership and decision making and its relevance to battle command. Specifically, regarding leadership, the topics of leadership skills, leadership styles, communication, and training are discussed. With respect to decision making, the roles of intuitive and analytical judgments, planning and problem solving, critical thinking, and visualization are considered.

SR 95-02 The U.S. Army survey of registered nurses and the U.S. Army survey of nursing students: Methodology and results, Ramsberger, R.F.; Barnes, J.D.; DiFazio, A.S.; Tiggle, R. April 1995. (AD A296 605)

This report details the methodology of and preliminary results from surveys of registered nurses (RNs) and nursing students. Representative samples of each were selected and their attitudes toward various aspects of nursing, and military nursing in particular, were assessed. The results indicate that there is a great deal of similarity between current and future RNs in terms of reasons for entering the field and positive and negative influences in that regard. Overall, current nurses were satisfied with their field, although there were areas of significant dissatisfaction (e.g., the amount of paperwork). The level of familiarity with the Army Nurse Corps (ANC) was high, and many aspects of the ANC were attractive to both current and future RNs. However, the possibility of relocation, chance of serving in/around combat, prospect of weekend Reserve duty, and military lifestyle were seen by large portions of each sample as being negative attributes of military service. Interest in enlisting in the ANC was fairly low among both groups, with significant portions of respondents indicating that the probability that they would join was smaller following Operations Desert Shield and Desert Storm.

SR 96-01 Estimation of retention parameters for the prototype officer personnel, inventory, cost and compensation (OPICC) model, Mackin, P.C.; Hogan, P.F.; Mairs, L.S. October 1995. (AD A313 541)

This research estimated a multiperiod Annualized Cost of Leaving (ACOL-2) model that predicts officer career decisions as a function of economic, demographic, and

Army personnel policy (e.g., military compensation) influences. The panel probit estimation yielded statistically significant pay but not unemployment effects. The research also found that fixed, unobserved preferences for military service significantly influence retention behavior. The estimation encompassed up to 13 consecutive annual "decision" points, with data taken from ARI's Officer Longitudinal Research Database, covering year groups 1979-1992. The retention parameter estimates were embedded in an Officer Personnel Inventory, Cost and Compensation (OPICC) Model. This PC-based prototype model was designed and developed to improve the Army's ability to effectively manage its officer force by providing policy makers with accurate information about the impact of policy changes, including promotion policy, compensation, and separation incentives. The OPICC model provides estimates of the impacts of policy and economic changes to the Officer Personnel Management Directorate inventory for a 6-year projection horizon. The prototype version does not contain a cost estimation capability. The model was validated by using it to predict actual historical behavior.

SR 96-02 Profiles of Montgomery G.L Bill and Army college fund soldiers, Gee, D.; Nelson, A. October 1995. (AD A304 920)

The Montgomery G.J. Bill (MGIB) and the Army College Fund (ACF) are important enlistment incentives to induce high-quality individuals to enlist in the Army. This report examines differences in participation and usage behavior of individuals in these programs. Descriptions of the MGIB and the ACF programs are provided. Tabulations present indications of differences by gender, race, entering educational level, and marital status for program participants and benefit users. The report also includes a description of who uses their benefits, when and where they are used, and how much is used. Regression analyses of the amount of benefit used for a sample of veterans who enlisted in Fiscal Year 1986 test whether or not there are differences in usage behavior for demographic factors, educational level at entry into the Army, and Armed Forces Qualification Test categories.

SR 96-03 Development of an Army prototype PC-based enlisted personnel allocation system (EPAS), Rudnik, R.A.; Greenston, R.M. October 1995. (AD A304 913)

The PC-based Enlisted Personnel Allocation System (EPAS) is designed to work in two modes -- Planning and simulation -- with a design that can serve as the core of a Production version. In planning mode the model provides analysis capability to Army managers by establishing the feasibility of new policy options, supply environments, and training restrictions. In simulation mode the model Provides detailed analysis of impacts by simulating individual applicant flow and job assignment. As a research tool, EPAS will also be particularly useful in the examination of the effects of alternative selection and classification techniques under development by U.S. Army Research Institute psychologists. Linear programming is utilized to allocate 1 years worth of recruit supply to MOS training requirements over a 24-month planning horizon so as to maximize the objective function (i.e., expected performance) while meeting manpower management and training constraints. This optimization Planning Problem has approximately 75,000 variables and 5,000 constraints. Reduced costs from the optimum planning solution are

used to score and rank alternative (non-optional) training assignments for the current month's contractees. This produces an ordered list of training start dates for each supply group, ranked from best to worst in terms of objective function payoffs. This "optimal guidance" is input to a detailed procedure to classify (i.e., assign) individuals. Once the current month's contractees are assigned, the planning window is moved along 1 month and the cycle is repeated.

SR 96-04 Outcome evaluation of the Army career and alumni program's job assistance centers (JAC), Sadacca, R.; Laurence, J.H.; DiFazio, A.S.; Rauch, H.J.; Hintze, D.W. October 1995. (AD A305 410)

The Army Career and Alumni Program offers transition services to service members and their families as well as to Army civilian employees who are separating from the service. This report evaluates the functions of the Job Assistance Centers (JAC) at which these services are provided. Approximately 3,000 ex-service members (Army, Navy, Marines, and Air Force), spouses, and separated civilian employees who transitioned between 1 October 1992 and 30 September 1993 were interviewed. The evaluation revealed that the more job search assistance services individuals received and the more satisfied they were with these services, the more they felt prepared for and achieved success in the civilian job market. Also, respondents who received more JAC-type services and who were satisfied with them felt more positive about recommending the military. Each job assistance service received increased annual earnings by $419.00, holding other factors constant. Given that the average 'one time' cost of JAC per client is $160.00, a net benefit is evident.

SR 96-05 Training aids, devices, simulators, and simulations (TADSS) study, Sulzen, R.H. November 1995. (AD A306 789)

The requirements for this study were: to identify how the available Training Aids, Devices, Simulators and Simulations (TADSS) are integrated into training programs, to evaluate user perceptions of TADSS, and to provide recommendations for a procedure to periodically gather this information. The methodology employed structured interviews given at eight posts selected for both Forces Command (FORSCOM) and Training and Doctrine Command (TRADOC) installations. Personnel were selected to represent the providers of TADSS and the users, from individual solder to training administrator Virtual Simulation was employed by the combat maneuver arms where available. Constructive Simulation is widely used by companies and battalions and not often by platoons. The TADSS most often used at platoon level was the multiple integrated laser engagement system or MILES. MILES was not consistently employed in a manner that would ensure realism or objective casualty assessment. Unit Conduct of Fire Trainer (UCOFT) and Weaponeer are the simulators most often used. The Standard Army Training System (SATS) is used mostly to prepare training schedules, but the software is unfriendly and needs considerable revision to reach its full potential. TADSS information should be collected on a periodic basis by TRADOC using a modified set of these study procedures.

SR 96-06 The Army alumni survey, Ramsberger, P.F.; Barnes, J.D.; DiFazio, A.S. November 1995. (AD A306 288)

Samples of Army veterans were selected to be representative of all Non-Prior Service Regular Army Accessions and a subgroup that entered during this period who completed the New Recruit Survey. Response rate to the survey was 25%. Results indicated that most respondents were satisfied with their Army experience. Nearly 80% rate themselves as successful in their civilian careers. About 34% have used their military-gained skills in their civilian careers, and 57% indicated that they used education benefits following separation. About 75% felt that their Army service made them more disciplined, mature, and self-confident. Large majorities stated that they would join the Army again, and 60% indicated that they still agree with their decision to leave when they did.

SR 96-07 Total Army personnel life cycle model (TAPLIM): The development of a GAMS formulation, Marquez, W.; Nelson, A. January 1996. (AD A315 220)

This paper describes the Total Army Personnel Life Cycle Model (TAPLIM) policy analysis model. A description of TAPLIMs features and solution methodology is presented. The paper also describes the conversion of TAPLIM into a formulation suitable to run in the General Algebraic Modeling System (GAMS) software. The result is an easy-to-use, maintain, and update model. This version of TAPLIM more efficiently accommodates the analysis of multiple personnel policies, decreases running time, and produces output that is suitable for import into a spreadsheet or immediate examination. Examples are presented to illustrate capabilities of the GAMS version of TAPLIM.

SR 96-08 Revision of the Army Career Transition Survey. Final study report, Giacalone, R.; Naughton, J. A.; Laurence, J. H.; DiFazio, A. S. August 1996. (AD A320 363)

From 1990-1995, the U.S. Army Research Institute for the Behavioral and Social Sciences administered an experimental exit survey to separating soldiers. This instrument was known as the Army Career Transitions Survey (ACTS). The ACTS was designed for use among separating Active Duty Army personnel to measure: satisfaction levels, perceptions of Army leadership, advice for potential recruits, and the reasons for leaving the Army. The Human Resources Research Organization was awarded a contract to develop standardized administration procedures and to review and revise the items on the ACTS. To meet the goals of this research, the approach primarily involved: gathering information through semi-structured interviews with pertinent commands and transition site personnel; reviewing the literature on leadership; pilot testing the revised survey instrument; and analyzing the results. Each of these efforts is addressed individually in this report.

SR 96-09 Downsizing the Army's active enlisted force: Implications for rotation patterns and associated personnel policies, Hogan, R. R.; Mehta, M.; Harris, D. A.; Nelson, A.; Greenston, R August 1996. (AD 319 594)

The drawdown of the active duty Army following the end of the Cold War has become disproportionately from overseas positions. As such it is both a drawdown and a restructuring. This shift to a more continental U.S. (CONUS)-based force could lead to unacceptable long tours in CONUS TDA positions, mismatches between the rank and skills of assigned personnel, and difficulty in transporting soldiers to obtain required professional development and training. Using a variety of simulation models, the effect of the changing authorization structure on average CONUS time on station, the number of rotational moves, and other variables was analyzed. Alternative methods to offset the effects of the change in billet structure, including changes in OCONUS tour lengths, increases in CONUS to CONUS operational moves, and a combination of the two methods were studied. The policies examined to offset potential CONUS stagnation appear more than adequate. For example, a policy of reducing OCONUS tour lengths by 1 year significantly increases rotational moves and reduces average CONUS time on station, by FY 1988, to below what it would have been otherwise. Overall, the simulations suggest that the potential problems posed by the change in authorization structure win not be severe and that policies can be adapted to offset any potentially adverse effects.

SR 97-01 The 1995 Gender Integration of Basis Combat Training Study, Mottern, J.A.; Foster, D.A.; Brady, E.J.; Marshall-Mies, J. February 1997. (AD A322 335)

This report summarizes a series of studies from 1993 through 1995 of the attitudes of soldiers-in-training and their training cadre during squad-level, gender-integrated Basic Combat Training (BCT) for soldiers in Combat Support and Combat Service Support military occupational specialties. During each of the three phases, soldiers completed a pre-training and post-training questionnaire, and the training cadre completed a post-training questionnaire. A total of 3,963 soldiers and 277 training cadre were surveyed. Focus groups were conducted with all-male and/or all-female groups from each of the participating companies and with male and female training drill sergeants. Training performance and soldierization in a gender-integrated environment were more positive for female soldiers and as positive as single-gender training for male soldiers. Preparation of drill sergeants -- especially training to work with and train female soldiers-is key to the success of gender-integrated BCT. Chain of command support is necessary for continued success of gender-integrated training.

SR 97-02 NTC-CD Systems: Recreating the NTC Experience, Lussier, J.W.; Michel, R.; Frame, A. February 1997. (AD A328 363)

Past research exercises at the Fort Leavenworth Research Unit have measured battle command skills of visualization and forecasting. A highly favorable response to these exercises coupled with CD-ROM capability to vividly present combat training center battles led to the current initiative: develop multimedia prototype instructional modules aimed at facilitating battle command competencies of visualization, information assimilation, forecasting, analysis, and battle-decision making. This initiative utilizes information from observations and interviews at the Command and General Staff

College's School for Command Preparation and of battle commanders and observer/controllers during National Training Center (NTC) rotations. Users are presented with NTC battles and prompted to make predictions, critiques, and other responses. The report structures synthesis of multimedia capability with battle command research to provide a CD-ROM tool that supports the developing educational needs of battle commanders.

SR97-03 Canceled.

SR97-04 Gender Differences in Job Satisfaction in the U.S. Army, Jones, J.T. August 1997. (AD A339 232)

This report summarizes findings from the *Spring 1995 Sample Survey of military Personnel (SSMP)* which focused on soldier satisfaction with aspects of their Army life, jobs, and careers. A total of 15,113 soldiers responded to the survey. There were few, if any, differences between males and females in their responses to items on Stress, Promotion Potential, and Global Satisfaction (job/career/life). Females were more positive in their responses to items covering Benefits, Family, Equity, Basic Pay, Job Security (officers only), and Job Characteristics (enlisted only). Males were more positive in their responses to items covering Co-Workers, Supervisors, Leadership, Developmental Courses (more likely to have had courses), and Absence from Duty Station for Military Reasons (more likely to be deployed/TDY/in training). Results from the survey did not identify any clear-cut relationships between job satisfaction and career intent for males or females; however, it does appear that separation from family may be an important factor in why some female soldiers decide to leave the Army.

SR 97-05 Adverse Impact Implications of Selection Instrument Group Score Differences, Silva, J.M. March 1997. (AD A338 809)

Human resources decision-makers are concerned when mean inter-group score differences on selection measures are observed. Moreover, they are not concerned with the magnitude of the differences *per se,* but rather with whether those score differences will manifest themselves as adverse impact. An analytical approach was used to estimate for various combinations of selection ratio and minority applicant group representation, the maximum group score difference that would not violate the "four-fifths" rule. In addition, applicant pools of specific sizes with no mean inter-group score difference on the selection measure were considered to compute the conservative likelihood of encountering an adverse impact situation in a specific applicant sample. The results clearly suggest that the identification of adverse impact and its statistical substantiation will often occur in small applicant pools (i.e., 100), even when there is a small inter-group difference on the selection measure. For larger samples (i.e., 500), the results suggest that adverse impact will often be indicated when small mean inter-group selection measure differences are present. It is not clear to what degree the adverse impact found would be statistically substantiated. Research focusing on adverse impact and its statistical substantiation is needed for specific inter-group difference/applicant

pool size combinations to create a clearer equivalence between inter-group differences and adverse impact.

SR 97-06 The Optimal Job-Person Match Case for Attrition Reduction, Greenston, P.M.; Nelson, A.; Gee, D. September 1997. (AD A338 823)

The purpose of this research is to illuminate an important interaction between personal characteristics and organizational factors as they affect first-term attrition. This study tests the hypothesis that first-term completion is positively related to predicted performance on the job and estimates the attrition reduction that would accompany the utilization of better methods for assigning recruits to jobs so as to improve their predicted performance. The testing is conducted with the 1991 accession cohort using the U.S. Army Research Institute for the Behavioral and Social Sciences' Enlisted Panel Research Data Base (EPRDB). Regression analysis is used to test for a relationship between attrition behavior and predicted performance on the job, holding other factors constant. This relationship is then applied to estimate the attrition reduction that could be brought about by increased soldier performance through improved job-person matching procedures such as the Enlisted Personnel Allocation System (EPAS).

SR98-01 Development of an Army Civilian Artificial Intelligence (AI) Specialty, Waugh, G.W. & Knapp, D.J. November 1997. (AD A343149)

The goal of this project was to develop the certification standards for the new specialty in Artificial Intelligence/Robotics (AI/Robotics) for Army civilians. A job analysis was conducted to identify AI-related job tasks performed by Army civilians and the knowledge areas (i.e., competencies) that are necessary to successfully perform them. Four one-on-one interviews and two workshops were used to develop comprehensive lists of AI-related job tasks and associated competencies. A job analysis survey was completed by 171 incumbents. The competency standards were developed at three workshops using the job analysis information. Competencies identified as the most important to successful job performance across different types of Army civilian jobs form the bases for the certification standards. To be certified, applicants will need to demonstrate that they have had sufficient amounts of education or experience or combinations of the two for all of the 6 "core competencies" and for three of the 18 "supplemental competencies."

SR98-02 PERSTEMPO: Its Effects on Soldiers' Attitudes, Alderks, C. E. June 1998. (AD A351768)

With the recent decreases in the U.S. Army of both personnel and resources and with the concurrent increase in missions performed, there has been concern that the amount of time soldiers are away from home station, or Personnel Tempo (PERSTEMPO), may have a negative impact on the attitudes of Active Component soldiers which in turn affect retention, readiness, and morale. This report investigates the relationship between various amounts of time soldiers are away from their duty stations and their attitudes toward the Army. Available data from the spring versions of the Sample Survey of Military Personnel from 1994 through 1997 were used. Data were analyzed with respect to time away from duty station.

The more time soldiers spend away from their duty station, the less likely they are to be satisfied with the "amount of time a soldier is separated from family." For those who are leaving or are thinking of leaving the Army, the first most important reason for officers and the third most important reason for enlisted personnel for leaving is the "amount of time separated from family." For officers and enlisted personnel as a whole, the amount of time away from the duty station has no statistically significant relationship with Army career intentions (leaving, staying in beyond the present obligation, or staying in until retirement), readiness, morale, stress levels, spouse support, family adjustment, and job satisfaction. This report provides a baseline from which leaders may gauge future attitudes and intentions in relation to the amount of time a soldier spends away from the duty station for deployments, training, etc.

SR98-03 Design of Econometric Module to Support the ODCSPER Strength Management Systems Redesign, Mackin, P.C., Hogan, P.F. & Greenston, P.M. March 1998. (AD A343086)

This study assessed alternative approaches to incorporating an econometric module in ODCSPER's redesigned strength management system. It includes an examination of the operation of the strength system and an assessment of the analytical needs of strength planners. The study also looked at available econometric methodologies and results available in the literature. These findings were integrated with an evaluation of the major management issues for individual Army personnel communities. Study findings include a recommendation on the module's design specification, including specification of key module algorithms and identification of appropriate econometric models and parameters. Other results include an evaluation of existing empirical parameters and recommendations for future econometric research to provide the module with new and improved parameters.

SR98-04 Training Analysis and Feedback Aids (TAAF Aids) Study for Live Training Support, Brown, B.R., Nordyke, J.W., Gerlock, D.L., Begley, I.J., and Meliza, L.L. May 1998. (AD A351107)

Maneuver Combat Training Center (CTC) and homestation requirements for exercise control and training feedback are intensive. With the advent of battlefield digitization; tactical decision aids; "smart, intelligent, and brilliant" munitions; advances in non-lethal weapons; and new reconnaissance, surveillance, and target acquisition (RSTA) systems, the workload for trainers continues to spiral. Force modernization is creating new control

and feedback tasks that have the potential to rob trainers of time they would otherwise spend observing, coaching, and facilitating the learning of exercise players. This study:

- Identifies the impact of force modernization on future exercise control and training feedback functions.
- Identifies tasks involved in after-action review (AAR) preparation, observer/controller (OC) coordination and mentoring, and take-home package construction.
- Provides strategies to reduce OC and Training Analysis Facility (TAF) workload.
- Identifies payoffs in task reduction achieved by each strategy.
- Does not provide technical solutions or an analysis of task criticality, complexity, duration, or frequency for exercise control and training feedback tasks identified.

SR98-05 Back-Up Training Requirements for the Digitized Battlefield: An Overview, Salter, M.S. & Black, B.A. (AD A354022)

This study report provides an overview of critical training issues facing the Army as the 21st Century Force becomes increasingly digital. The focus of this report is on understanding the significant change brought about by digitization and the ramifications that may result in degraded mode or back-up training requirements. This report is the first of three prepared under the U.S. Army Research Institute's Studies and Analysis effort titled "Back-Up Training Requirements for the Digitized Battlefield." Issues and concerns documented in this report are addressed in two subsequent study reports: "Analysis of Emerging Digital and Back-Up Training Requirements" and "Issues and Recommendations: Training the Digital Force."

The impetus for this effort was provided by the Deputy Chief of Staff for Personnel's Directorate of Personnel Technologies. Of concern was the lack of analysis regarding how the Army should address training and sustaining conventional or back-up skills for operations when digital system capabilities become degraded. This issue will become increasingly important as digitization of the force increases and resources decrease.

SR98-06 Issues and Recommendations: Training the Digital Force, Campbell, R., Ford, L., Shaler, M., and Cobb, R. August 1998. (AD A351985)

Digitization is the future of the Army. However, along with digitization come training and personnel implications. This report discusses training issues associated with digitization, specifically those that address a need to train and maintain back-up skills along with digital skills. Back-up skills are those needed by soldiers to operate when digital systems are degraded or unavailable. Using the M1A2 Abrams Main Battle tank and M2A3 Bradley Fighting Vehicle as exemplar systems, the study explores issues that are applicable to a wide range of digital applications and training conditions. The study employed a series of expert groups to define issues and formulate recommendations. These groups included users, developers, researchers, and trainers with a wide spectrum of experience and viewpoints. The results are 15 primary issues and accompanying

recommendations that are selected for presentation in this report. The issues selected are those that warrant high level Army attention.

SR98-07 Analysis of Emerging Digital and Back-up Training Requirements, Ford, L.A., Campbell, R., and Cobb, R. August 1998. (AD A354190)

Digitization is the future of the Army. However, along with digitization come training and personnel implications. This report discusses training issues associated with digitization, specifically those that address a need to train and maintain back-up along with digital skills. Back-up skills are the individual and collective skills required when digital systems are degraded or unavailable. The study focused on the digital M1A2 Abrams Main Battle training program as an exemplar. Lessons learned about digital and back-up training requirements should be applied in the M2A3 training program. The study investigated issues that are applicable to a wide range of digital applications and training conditions. The study examined individual and collective tasks that support tank operations and found both digital and back-up tasks to be poorly defined, particularly in collective performance. A method for analysis is described and analytic results reported. The study also outlines the current state of training armor and infantry soldiers and the impact that increased digitization may have on training pipelines. The study employed a series of expert groups to define issues and formulate recommendations. These groups included users, developers, researchers, and trainers with a wide spectrum of experience and viewpoints. Expert group results are reported and include 15 primary issues and accompanying recommendations.

SR99-01 Use and Management of Digital Information by Army Aviation Battalion Battle Staff Members, Howse, W.R. and Cross, K.D. April 1999. (AD A364606)

This report is based on empirical research embedded within a training simulation exercise. Brigade and battalion tactical operations centers were replicated with partial implementations of the Army Tactical Command and Control System digitized suite. The brigade installation served as a control center. Observational data were compiled from events and activities in the battalion installation. Over a five-day period a student battalion battle staff conducted mission planning and execution functions within an operational scenario presented through a confederation of computer based simulation systems. Observers recorded events during mission planning, execution and after-action reviews. The student battle staff members completed questionnaires covering background and experience prior to the exercise, activities and experiences during mission planning, and a questionnaire seeking their impressions of potential training effectiveness. Key staff members were interviewed during the week following the exercise. Findings address tactics, techniques, and procedures for utilizing digital command and control systems in the military decision making process and the decision support template and recommend information display configurations.

SR99-02 Cognitive Requirements for Information Operations Training (CRIOT), Brown, B.R., Anderson, L., Begley, I.J. II, and Meliza, L.L. June 1999. (AD A365483)

The advent of battlefield digitization increases the work trainers for live force-on-force exercises must do to control exercises and provide feedback to units, and it will pull trainers at platoon and company level out of the tactical information loop. The goal of this study was to describe instrumentation capabilities with the potential for reducing workloads and pulling trainers back into the information loop for exercises at the Army's maneuver combat training centers (CTCs) and at home stations. This study documents the experiences of approximately seventy of the National Training Center (NTC) observer/controllers (OCs) and analysts that participated in the training of the Army's first digitized brigade during the Force XXI Army Warfighting Experiment (AWE). To gain a better understanding of what is required to support digital training, the study team reviewed emerging tactical doctrine from platoon through battalion task force level to develop a sample of potential digital training points and then designed displays that would help a trainer monitor unit performance with respect to these points. The team then defined the capabilities a workstation would need to create these displays. This report describes, defends and illustrates twenty workstation capabilities that support exercise control and feedback for digitized units.

SR99-03 Findings from the Survey on Officer Careers-1996, HumRRO, and Jones, J.T. August 1999. (AD A370305)

This report summarizes findings from the *1996 Survey on Officer Careers (SOC). SOC* is a continuation of the *Longitudinal Research on Officer Careers (LROC)* survey research program. The *LROC* program called for similar surveys to be mailed to a longitudinal sample of company grade officers each year over a number of years. Surveys were administered in 1988, 1989, 1990, and 1992. The *SOC* was first administered in May of 1996. Samples for *SOC* included all officers who had responded to any of the *LROC* surveys and who were still on active duty, as well as a new randomly-drawn cross-sectional sample of officers at all ranks. This report summarizes findings for the new 1996 cross-sectional sample of officers. The *SOC* continues to provide data on the values, attitudes, family situations, and career experiences of Army officers who are serving in Army Competitive Category branches. *SOC* results will be used to test models of work, career, family, and personal factors that influence officers' career decisions. The *SOC* also provides a rich longitudinal database for examining the Army experience from a long-term perspective.

SR99-04 Modeling the Individual Enlistment Decision: Analysis of the Career Decision Survey, Sticha, P.J., Knerr, C.M., Ramos, R.A., and DiFazio, A.S. September 1999. (AD A373970)

Recently, youth interest in military service has declined, making it difficult for the Army to recruit sufficient soldiers to maintain its strength. To address this problem, research was conducted to (a) refine enlistment propensity measures to increase their accuracy, (b) develop improved measures to segment the youth population, and (c) increase understanding of the enlistment decision process.

A Career Decision Survey was developed and administered to a representative sample of males from 16 to 21 years of age. The survey measured enlistment propensity, as well as

reasons for enlisting, self-assessed aptitude, personality and temperament, military knowledge and attitudes, career preferences, work values, career decision making, high school activities, physical fitness, family structure, and neighborhood safety. Finally, the survey included a telephone-administered word knowledge test.

Analyses identified several individual characteristics that predict enlistment behavior, including attitudes toward conditions of military service, physical fitness, family structure, and academic support and activities. The telephone word knowledge test provided a quick and reasonably accurate measure of aptitude that could be used to segment the youth population by aptitude. The telephone word knowledge test and selected survey items are reasonable additions to the Youth Attitude Tracking Study (YATS). In addition, analysis results have direct implications for recruiting policy.

SR99-05 Advanced Tactical Engagement Simulation Concepts (ATESC), Brown, B.R., Anderson, L., Begley, I.J., and Meliza, L.L. September 1999. (AD A369821)

Trainers for force-on-force training exercises at the Army's maneuver combat training centers and at home station are often distracted from coaching and mentoring responsibilities by the need to perform exercise control and feedback (CAF) functions. The fielding of new weapons and reconnaissance, surveillance, and target acquisition (RSTA) systems as part of force modernization will overwhelm trainers with new requirements unless improved concepts for tactical engagement simulation (TES) and instrumentation systems (IS) are implemented . This study produced an online database that was used to assess the benefits of implementing various new TES and IS concepts, or combinations of concepts, in terms of the number of CAF functions automated, the extent to which each function disrupts trainer coaching and mentoring activities, the number of gaps in training feedback addressed, and the number of systems to which each function or feedback gap applies. The TES and IS concepts we evaluated were designed to address the additional goal of avoiding the stove-pipe nature of past systems. The online database can be used to examine the benefits of additional TES and IS concepts. The study sponsor is using the results to define requirements for future TES systems and IS for live training at CTCs and home stations.

Study Notes

SN 95-01 Contract for manpower and personnel research and studies (COMPRS) for the U.S. Army Research Institute. Annual Report, HumRRO. November 1994. (AD A290 536)

This report documents the first year of a 5year project to provide the U.S. Army Research Institute for the Behavioral and Social Sciences short- and medium-term scientific and technical support in solving problems related to manpower and personnel. The three Contract for Manpower and Personnel Research and Studies (COMPRS) Programs are (1) quick reaction; (2) attitude and opinion surveys; and (3) medium term. During the first year of the contract, 27 delivery orders were initiated. This report includes examples of problem and objective statements and summaries for each delivery order (including problem, objectives, status, results, bibliography, products, and planned documents and products). The intent is to give a very brief overview of each effort.

SN 96-01 Contract for manpower and personnel research and studies (COMPRS) for the U.S. Army Research Institute (ARI) standard operating procedures (SOP), HumRRO. November 1995. (AD A314 868)

This report documents the Standard Operating Procedures (SOP) for the COMPRS contract, which is a 5-year (2 base years plus a 3-year option period) effort administered by means of firm fixed-price delivery orders. This document is intended to provide guidance for both contractor personnel and in-house personnel involved in monitoring the overall contract or individual delivery orders. As such, it provides a good example of successful contract administration in the area of behavioral and social sciences.

SN 96-02 Contract for manpower and personnel research and studies (COMPRS) for the U.S. Army Research Institute (ARI) - annual report: Year two, HumRRO. December 1995. (AD A305 385)

This report documents the second year of a 5-year project to provide the US. Army Research Institute for the Behavioral and Social Sciences short- and medium-term scientific and technical support in solving problems related to manpower and personnel. The three COMPRS programs are (1) quick reaction; (2) attitude and opinion surveys; and (3) medium term. During the second year of the contract, 10 delivery orders were initiated, 8 in the quick response program and 2 in the medium-term program. This report includes examples of problem and objective statements and summaries for each delivery order (including problem, objectives, status, results, bibliography, products, and planned documents and products). The intent is to give a very brief overview of each effort.

SN 96-03 Updating data bases for modeling Army college fund and Montgomery GI Bill usage, Young, W. January 1996. (AD A309 522)

This note describes the Army College Fund (ACF) and the Montgomery GI Bill (MGIB) databases and the updating process. The ACF database contains longitudinal records of soldiers who enlisted in the Army and enrolled in the ACF Program between fiscal years 1981 (FY81) and 1985. This data base includes educational benefit program participation and usage information, demographic characteristics, attrition and reenlistment data, and other Personal and career history data elements. The ACF database is updated annually. The MGIB database contains information on soldiers who enlisted and enrolled in the new educational assistance program, MGIB program that was implemented on I July 1985. This database, which is updated quarterly, includes demographic data and educational benefit participation and usage information.

SN 96-04 Canceled.

SN 96-05 Update of the U.S. Army Research Institute's enlisted panel research data base for 1993 and 1994, Ramsey, L.J.; Fertig, KL. January 1996. (AD B210 853)

This document describes the Procedures performed to update the Enlisted Panel Research Data Base (EPRDB) with 1993 and 1994 personnel data. The EPRDB consists of longitudinal records containing both personnel and career history fields for U.S. Army enlistees. The data base consists of two data sets -- a 25-percent sample of those individuals who began their first tour of active duty in 1974 through 1984 and a 100-percent sample of those individuals who entered active duty for the first time in 1985 through 1994.

SN 96-06 Update of the U.S. Army Research Institute's Officer Research data base for 1993 and 1994, Ramsey, L.J.; Fertig, K.L. February 1996. (AD B213 178)

This document describes the procedures to add 1993 and 1994 data to the Longitudinal and COR data sets of the Officer Longitudinal Research Data Base (OLRDB), the Officer Administrative Data Base (OADB), and the Core Data Set of the Officer Standardized Educational Testing Data Base (OSETDB). These data sets contain career history data for active duty US. Army officers and were constructed primarily from the Officer Master Files (OMF) and the Separation Officer Master Files (SMF). A secondary data source was added to capture early separation incentive information from the Voluntary Separation Incentive/Special Separation Benefit (VSI/SSB) file. The OSETDB Core Data Set also contains 1973 through 1985 Scholastic Aptitude Test (SAT) and American College Test (ACT) scores.

SN 96-07 Feasibility study of a FAARRS-SHARE methodology for the U.S. Army Reserve, Brockett, R L.; Rousseau, J J.; Wang, Y. June 1996. (AD A319 612)

This report describes research into the feasibility of developing a Forecasting and Allocation of Army Recruiting Resources Study-Sequential Hierarchical Allocation of Resource Elements (FAARRS-SHARE) system for the U.S. Army Reserve. FAARRS-SHARE provides the Army's active component a means of analyzing the impact of recruiting resources on accessions and the ability to estimate the resources necessary to

achieve specific accession levels. This study explores the feasibility of developing a Reserve FAARRS-SHARE system by examining the underlying models for the FAARRS-SHARE system and beginning an investigation of new, more appropriate methodologies. Building on new developments in sensitivity/stability analysis in Data Envelopment Analysis (DEA) formulations are developed for estimation of an approximate empirical Production function for U.S. Army Reserve recruiting. Parameters of an empirical production function are estimated and reported.

SN 96-08 Monitoring the attitudes and perceptions of junior officers: The longitudinal research on officer careers (LROC) survey, McCloy, R A.; Laurence, J H.; DiFazio, A. S. August 1996. (AD A320 598)

The purpose of this study was to assist in the transition of the Longitudinal Research on Officer Careers (LROC) survey from a research to an operation tool. Significant Predictors of officer retention included retention propensity, a positive comparison between military and civilian jobs, and perceived ease of entering the civilian job market. Specific recommendations were made on how to transition the survey effort to an operational environment.

SN 97-01 Virtual Environmental Interface Requirements for Combat Leader Training and Rehearsal, Sticha, PJ.; Campbell, R.C.; Schwalm, S.R. August 1997. (AD A335 858)

The Army has made a substantial commitment to the use of networked computer simulations for training, concept development, and test and evaluation. The current networked training system - Simulation Networking (SIMNET) - and the next generation system - the Close Combat Tactical Trainer (CCTT) - provide effective forms of training for soldiers fighting from vehicles, but these systems are unable to do the same for individual dismounted soldiers. Virtual Environment (VE) technology has the potential to provide Individual Combat Simulations (ICS) for the electronic battlefield. This report reviews the current state-of-the-art and projected future capabilities of the VE technologies associated with speech recognition, gesture recognition, and, computer-generated forces. The review provides a roadmap that outlines the potential applications of these VE technologies for training, mission rehearsal, and performance measurement for combat team leaders; enumerates the technological capabilities need to implement these applications; specifies realistic near-term goals for prototype development and testing; and identifies knowledge gaps and the research needed to fill them.

SN 98-01 Contract for Manpower and Personnel Research and Studies (COMPRS) for the U.S. Army Research Institute for the Behavioral and Social Sciences -- Annual Report: Year Three, HumRRO. February 1998. (AD A338818)

This report documents the third year of a 5-year project to provide the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) short- and medium-term scientific and technical support in solving problems related to manpower and personnel. The three COMPRS programs are (1) quick reaction; (2) attitude and opinion surveys; and (3) medium term. During the third year of the contract, 14 delivery orders were initiated, 9 in the quick reaction program, 1 in the attitude and opinion survey program, 3 in the medium-term program, and one for contract administration. This report includes a summary of activities during the first three years of the contract, plus a very brief overview of each delivery order (including problem, objectives, status, results, bibliography, products, and planned documents and products).

SN 98-02 Contract for Manpower and Personnel Research and Studies (COMPRS) for the U.S. Army Research Institute for the Behavioral and Social Sciences -- Annual Report: Year Four, HumRRO. February 1998. (AD A338780)

This report documents the fourth year of a 5-year project to provide the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) short- and medium-term scientific and technical support in solving problems related to manpower and personnel. The three COMPRS programs are (1) quick reaction; (2) attitude and opinion surveys; and (3) medium term. During the fourth year of the contract, 13 delivery orders were initiated, 9 in the quick reaction program, 1 in the attitude and opinion survey program, and 3 in the medium-term program. This report includes a summary of activities during years one through four of the contract, plus a very brief overview of each delivery order (including problem, objectives, status, results, bibliography, products, and planned documents and products).

SN 98-03 Design Considerations for the Enlisted Personnel Allocation System (EPAS) in Its Interface with the Army Recruit Quota System (REQUEST), McWhite, P. & Greenston, P.M. February 1998. (AD A339043)

The PC-Based Enlisted Personnel Allocation System (PC-EPAS) is an automated model designed to optimally match recruits into jobs by maximizing expected soldier performance subject to training management constraints. This report presents an overall concept of how EPAS optimal guidance would interface with the existing Army Recruit Quota System (REQUEST).

SN 98-04 Application of Lightfoot's Cluster Evaluation System to Current Problems in Army Occupational Analysis, Lightfoot, M.A., Diaz, T.E. & Vladimirsky, Y. January 1998. (AD A339235)

The study objective was to build a prototype cluster structure validation methodology and to test it in a population data base of Army military occupational specialties. We developed a cross-validation and internal validity (CV*IV) procedure for estimating the cluster structures of empirical data bases. The major contributions of the CV*IV procedure are that it can be used with many different types of empirical data and includes a statistical approach for identifying optimal cluster structure. We validated the CV*IV procedure through an experimental design that allowed us to analyze the properties of the statistical test in terms of Type I error rate, power, and precision. The results provide strong support for the validity and utility of the CV*IV procedure for estimating population cluster structure from sample data. First, the statistical test preserved the Type I error rate of .05. Second, the power of the test ranged between 86% and 100% across sample sizes. Third, 63% of the sample results matched the cluster structure of the Army job population data base. The CV*IV procedure has wide application for the analysis of cluster structures in a range of data bases in both research and applied settings across the social and physical sciences.

SN 98-05 Multinational Force and Observers (MFO) Telephone Interview Follow-Up Survey Methods, Rauch, H.J., Becher, D. & Lang, V. November 1997. (AD A342372)

The Army Research Institute for the Behavioral and Social Sciences contracted with the Human Resources Research Organization (HumRRO) and Westat to conduct telephone interviews with members of the Multinational Force and Observers (28th rotation) and their spouses. The interviews were conducted as a follow-up to a series of mail-based surveys administered earlier by ARI. The substantive content of the telephone interviews was consistent with the content of the mail surveys.

Extensive efforts were made to locate the MFO soldier population as part of this research. A number of automated and investigative resources were used to locate the soldiers, including Telematch, Equifax Government and Special Services, directory assistance, and the Internet. About 19 percent of the MFO soldier population was not located. A total of 336 interviews were completed with MFO soldiers, and 102 interviews were completed with their spouses.

SN 98-06 Contract for Manpower and Personnel Research and Studies (COMPRS) for the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI)—Final Annual Report: Year Five, HumRRO. July 1998. (AD A349445)

This report documents the fifth and final year of a 5-year project to provide the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) short- and medium- term scientific and technical support in solving problems related to manpower and personnel. The three COMPRS programs are (1) quick reaction; (2) attitude and opinion surveys; and (3) medium term. During the fifth year of the contract, 20 delivery orders were initialized , 14 in the quick reaction program, 3 in the attitude and opinion survey program, and 3 in the medium-term program. This report includes a summary of activities during the life of the contract, plus a very brief overview of each delivery order awarded under this contract.

SN 99-01 Contract for Manpower and Personnel Research Studies II (COMPRS II) for the U.S. Army Research Institute (ARI): Year 1 – Standard Operating Procedures, HumRRO. October 1998. (AD A355123)

This report documents the Standard Operating Procedures (SOP) for the COMPRS II contract, which is a 5 year (one base year plus four one year option periods) effort administered by means of firm fixed-price delivery orders. This document is intended to provide guidance for both contractor personnel and ARI personnel involved in monitoring the overall contract or individual delivery orders. A such, it provides a good example of successful contract administration in the area of behavioral and social sciences.

SN 99-02 CATBOOK- Computer Adaptive Testing: From Inquiry to Operation, Sands, W.A., Waters, B.K. and McBride, J.R. January 1999. (AD A359337)

HumRRO contracted with ARI, sponsored by OASD/P&R (AP), to produce a book for commercial publication by the American Psychological Association (APA) which documents the research and development of computerized adaptive testing (CAT) as a means of administering the Armed Services Vocational Aptitude Battery (ASVAB), the personnel selection test battery used by the Department of Defense (DoD). The CAT-ASVAB program began in 1979, and bore operational fruit in 1992, when CAT-ASVAB went into limited use in an operational test and evaluation. CAT-ASVAB has since been approved to replace conventional, printed versions of ASVAB, Beginning in 1996 in all Military Entrance Processing Stations (MEPS).

The principal objective of this book is to document the psychometric research and development of the CAT-ASVAB program and the important practical lessons learned in developing its delivery system. The approach does this in a historical context. A secondary objective of the book is to provide a case study of the entire CAT-ASVAB program. The book primarily addresses three aspects of CAT-ASVAB history in DoD (adaptive testing measures and strategies; CAT-ASVAB system design issues; and CAT-ASVAB evaluation). It provides reference information useful to practitioners developing a computerized testing system.

SN 99-03 Tacit Driving Knowledge, Emotional Intelligence, Stressful Events, and Accident Risk: Traffic Safety Implications, Legree, P.J., Martin, D.E., Medsker, G.J., and Gregory, E.L. June 1999. (AD A365265)

We developed two tacit driving knowledge scales to investigate whether safer drivers can more accurately assess risks associated with a variety of driving conditions including road hazards and the driver's internal or emotional state. The tests were administered with a battery of conventional cognitive tests, personality instruments and situational variables chosen to predict accident involvement. The correlations between the tacit driving knowledge measures and the accident criteria ranged up to .22 ($p<.001$), and compared favorably to correlations between the accident criteria and the conventional measures. Odds ratios for the tacit driving knowledge tests show that low and average scoring participants had 5 and 2.3 times as many at-fault accidents as high scoring individuals. The data also indicate that stress, fatigue and illness elevate accident risk. The analyses demonstrate the importance of emotional and tacit knowledge and provide specific recommendations to improve driver safety.

SN 99-04 Two Studies of Military Vehicle Operator Selection and Safety, Medsker, G.J., Burnfield J. L., Knapp D.J., & Legree, P. J. September 1999. (AD A368619)

The objective was to identify characteristics commanders can use to select safer drivers from among soldiers. This project involved a literature review on accident predictors, statistical analysis of soldier characteristics and accidents, testing of new measures for predicting accidents, and development of practical guidelines leaders can use to select drivers. The majority of this project focused on conducting two empirical studies. Study 1 used Project A selection, personnel, and 1983-98 U.S. Army Safety Center (USASC) accident records for 60,500 soldiers who accessed in 1986-87. Study 2 used personnel data and 1983-98 USASC accident records, combined with responses from a new 1998 data collection involving 551 soldiers. Predictors included aptitude, temperament, driving behavior, transient, and demographic variables. Predictors' relationships with eight accident criteria were analyzed: costs, injuries, fatalities, work days lost, severity, total accidents, at-fault accidents, self-report accidents, and USASC accidents. The most useful predictors included perceptual aptitude, following regulations/orders, tacit knowledge tests, use of alcohol/drugs, moving violations tickets, a rugged individualism interest profile, attitudes toward Army discipline, stress, fatigue, seatbelt use, speed, time of accident, and being on post or duty.

Research Notes

RN 95-01 The content, construct and criterion-related validity of leader behavior measures, Atwater, L.; Lau, A.; Bass, B.; Avolio, B.; Camobreco, J.; Whitmore, N. October 1994. (AD A290 124)

This report is the second in a series on methods and results of a longitudinal study of leadership and its development on a sample of candidate officers presently enrolled in a military college. Included in the report are results from the first set of comprehensive assessments, which examined the content, construct, and criterion-related validity of leadership measures. Data were collected using a multi-source/multi-method approach from the entering class of 1991 at Virginia Military Institute. Methods of data collection included interviews, structured observations, surveys of management and leadership behaviors, and leadership logs (critical incidents). Sources of leadership information included superiors, peers, self, and subordinates. Convergence across both methods and sources on the leadership behaviors displayed by subjects was found. Data on leadership thus far collected provide a reliable and valid baseline for future research, and support the content, construct, and criterion-related validity of the leadership measures used.

RN 95-02 Advanced team decision making. A model and training implications, Zsambok, C.E. October 1994. (AD A289 855)

In this research, our primary goal was to develop a theory-based training program that would enable U.S. Army Officers to achieve more effective strategic team decision making. Commensurate with Small Business Innovation Research program aims, our secondary goal was to commercialize this project beyond the testbed domain. We were successful in achieving both goals. First, we produced a model of Advanced Team Decision Making (ATDM) and an accompanying training program that has been embedded in the strategic decision-making curriculum of the Industrial College of the Armed Forces. Results of a formative study lend positive support to (a) the validity of core concepts of the ATDM model; (b) the relation of the model to common constructs in the current teamwork literature; (c) the conclusion that trainees improve their ability to discriminate good versus poor decision-making behaviors when given guided practice with the model; and (d) the conclusion that trainees improve their awareness of the link between their team product's quality and their ability to engage in ATDM behaviors. Second, we have commercialized the program within a new domain that extends the model's applicability from strategic planning and decision making with ad hoc teams to tactical planning and decision making with both ad hoc and intact teams.

RN 95-03 Training metacognitive skills for problem solving, Geiwitz, J. November 1994. (AD A290 310)

Metacognitive skills that involve monitoring and control of cognitive skills like problem solving develop in expert executives and lead to great improvement in the problem-solving process. In this report, we review theory and research on metacognition to construct a conceptual model that has three characteristics: (1) it shows the interrelationship of

metacognitive skills and cognitive task performances, (2) it suggests the most valid assessment techniques for the measurement of metacognitive skills, and (3) it shows the development of metacognitive skills. From the third characteristic, we designed a training program to accelerate the acquisition of metacognitive skills in officers in the U.S. Armed Forces. From the second characteristic, we will construct proficiency tests of metacognitive skills for measuring these skills in commanders at various levels of professional development; the tests will also be used to evaluate the effectiveness of the training.

RN 95-04 An investigation of coping and adaptation in USAREUR: Criteria of adaptation, life role demands faced by first term enlistees, and services provided by USAREUR agencies, Dawson, R.; McGuire, W.J.; Brooks, M.M; Hebein, J.M. November 1994. (AD A291 532)

This research is part of the Life Coping Skills in USAREUR Project that was initiated to investigate the assumption that there is a relationship between a first-term enlistee's ability to function both on and off the job and the extent to which soldiers adapt to new environments. Adaptation is important because research suggests that success in this area affects mission readiness. The report addresses three questions: what indicators differentiate between soldiers who have and those who have not adapted to new environments?, what life role demands are commonly faced by first-term enlistees?, and what services provided by the U.S. Army in Europe are available to help first-term enlistees cope with everyday life? Major life coping areas explored include health, legal, leisure, work, education, and consumer/financial. To gather this information, first-term enlistees, first-line supervisors, and representatives of military agencies were surveyed and interviewed. Results of interviews were used to determine priorities for subsequent activities, especially in curriculum, instruction/training, and assessment efforts.

RN 95-05 Life coping skills in USAREUR pilot program, Dawson, R.; Hebein, J.; Maddox, C.; Kerr, M.; Brooks, K; Fullard, M. November 1994. (AD A289 936)

The *Doing it in Deutschland* programs were developed to teach first-term enlisted soldiers in USAREUR the knowledge and skills needed to (1) use public transportation in Germany, (2) eat out on the economy, (3) use USAREUR community resources, (4) shop in German stores, and (5) understand the legal aspects of living m Germany. The programs are competency-based, multi-media programs that utilize two delivery systems: first, a mass media approach with AFN radio and Stars and Stripes newspaper and, second, Army education centers. The programs were tested and formatively evaluated in controlled settings. The findings in this report subsequently served as the database for decisions regarding modifications for program revisions.

RN 95-06 Coping and adaptation: Theoretical and applied perspectives, Dawson, R.; Sharon, B.; Brooks, Y.; McGuire, W. November 1994. (AD A290 513)

Soldiers who have limited skills and affective attributes from which to draw to cope with the barrage of requirements from assignment in Germany are less likely to adapt successfully to that environment. At the level of the individual soldier, actions could be taken

to assist in acquisition of vital life coping skills that, in turn, would facilitate successful adaptation to life in Europe and reduce problems with retention and performance. This report describes the theoretical framework for the Life Coping Skills in USAREUR project, develops a model of the coping process, summarizes studies that have identified needed life coping skills, reviews literature related to adaptation to the military and to foreign countries, and makes recommendations concerning directions and procedures for project tasks.

RN 95-07 Measuring the costs and benefits of Army service, SAG Corporation. November 1994. (AD A289 935)

This research puts the costs and benefits of Army service into a social accounting framework. The traditional budget cost and defense readiness perspective is expanded to account for joint product effects of Army service. The analysis concentrates on Army personnel and training programs, noting that the value of military experience and training in the civilian sector is a major area in which the social value of Army service is likely to exceed the private value. The social value of certain forms of unit training and exercises is scrutinized to detect potential structural changes that yield additional social benefits. The analytical framework developed helps the Army to better understand the true social costs and benefits of its personnel and training programs; to choose ways of achieving a given level of military readiness that produces the greatest net social value; to articulate to Congress the social value, in addition to the military readiness value, of some of its programs, thus producing more informed decisions concerning defense and non-defense uses of taxpayer resources; and to explain to potential recruits and to the taxpayer the value of some Army programs to other sectors of the economy.

RN 95-08 Macroprocesses and adaptive instruction, Tobias, S. November 1994. (AD A290 483)

A paradigm for the unobtrusive monitoring of students' cognitive processing of instruction (macroprocessing) by microcomputer was developed for this project. The paradigm was used in four experiments that examined the types of processing students use during their reading of expository texts. The results indicated that students' voluntary use of macroprocesses and review was highly variable and ineffective. However, when the instructional system prescribed or prompted use of review if there was evidence of poor comprehension, or when an explanation of the value of review was provided, learning generally improved, especially for students with limited prior knowledge of the content. The implications of these results for further research are discussed. The findings also suggest that the paradigm can be used to deliver cost-effective instruction to improve students' cognitive processing of reading and ultimately their comprehension. This project solved some of the programming, procedural, and technical problems encountered in developing a computer-based delivery system for such instruction.

RN 95-09 A life course analysis of the military service of 1966 graduates of an eastern university. Journal of Political and Military Sociology 1995, Vol. 23 (summer): 65-79, Frieze, I.H.; Grote, N.K; Bookwala, J.; Capps, W.; Schmidt, L. November 1994. (AD B196 249L)

A group of Princeton alumni, all who had graduated from college in 1966, were studied to determine the long-term effects of military service in this elite group. The total group of 378 was subdivided into those who had served in Vietnam (n=52), those who had served in the military in some other location (n=77), and those who did not serve in the military (n=249). Overall, all groups saw the Vietnam war as having a major impact on their lives. Three separate studies were done using data from this sample. In the first, it was found that the Vietnam veterans did have evidence of long-term debilitating effects of service. The second study analyzed changes in political attitudes. The Vietnam veterans were found to hold the most politically conservative attitudes both before and after the war. All groups became more supportive of military action between 1966 and 1991. In the third study, the effects of social support on physical and mental health at midlife were assessed for the groups. For all groups, reliance on the self was associated with lower health outcomes. Marital support was highly important for mental health.

RN 95-10 Developing automatic components for complex tasks, Schneider, W. November 1994. (AD B196 539)

This report reviews the program of research to understand the nature of automatic process development and its role in building skilled performance in troubleshooting and high workload domains. The contributions can be divided into three major themes. The first theme involves modeling skill acquisition and performance in high workload tasks. The second investigates the buildup of component fluency in problem-solving tasks, including troubleshooting and algebraic tasks. The third involves reports about the computer methods that have been developed as we produced tools to enable the modeling and empirical data collection work to proceed. Abstracts of 21 papers are included. The major contributions include review of the working memory literature; development of controlled/connectionist models of working memory and high workload performance; interpreted changes in high workload performance; examined acquisition of electronic troubleshooting gate knowledge; empirically tested transfer from component learning to troubleshooting contexts, the role of practice in working memory and how changes in sequences of processing (reloading and executing a production) enhance learning. Five guidelines for developing automatic component skills are discussed. Models of working memory, high workload learning, and declarative learning are discussed. Efforts to enhance development of computerized research are listed.

RN 95-11 A study of cohesion and other factors of major influence on soldiers and unit effectiveness, Yagil, D. January 1995. (AD A299 079)

The present research focuses on the issue of small unit cohesion based on organizational bonding, horizontal bonding, and vertical bonding in relation to unit effectiveness. The study analyzes the intervening effects of professionalism confidence in the commander, commander tenure, morale, motivation, and stress on the relationship between cohesion and effectiveness. A questionnaire set composed of the ARI "Platoon cohesion index," and the IDF Questionnaire was administered to 1 8 infantry platoon and 7 armor companies. Higher Commanders of the units evaluated the units with regard to the research variables. The results indicate significant

correlations between cohesion and unit effectiveness. Differences were found in the relationship of the cohesion dimensions to effectiveness to other variables. The results also revealed differences between soldiers and commanders in their perception of the relationship between cohesion and personal effectiveness. Morale and stress were found to be intervening variables, effecting the relationship between cohesion and effectiveness. The implications of the results to unit processes and further research directions are discussed.

RN 95-12 Optimal averaging in performance testing, Jones, M.B. January 1995. (AD A298 836)

The purpose of this research was to develop a methodology for optimizing the temporal stability and predictive validity of performance tests and to apply that methodology to the Project-A, computer-administered tests. In the present research, a performance test is treated as a task to be practiced, and tests are analyzed as individual differences in skill acquisitions and retention. Classical test theory is also used. The predictive validity of the Project-A, computer-administered tests for a simulated anti-aircraft criterion task was studied over a 4-month interval in a sample of 102 college students; the 4-month temporal stability of the tests was studied concurrently in the same sample. Three of the 10 Project-A tests (Choice Reaction, Target Tracking 2, and Cannon Shoot) show a forward stability optimum. Cannon Shoot also has high predictive validity (.59). It could have the highest predictive validity of any test in the Project-A battery if its temporal stability could be improved. In none of these tests, however, can temporal stability be improved by lengthening the tests.

RN 95-13 Level and type of capability in relation to executive organization, Jaques, E.; Stamp, G. January 1995. (AD A298 621)

The specific objective of this report is to test earlier work on the assessment of individual capability to perform in real life with reference to the capability to carry responsibility at higher levels of work in both civilian and military organizational settings. In relation to this objective, this report increases scientific understanding of the meaning of human capability in action and of the nature of the psychological processes underlying the level of complexity of action the person can generate, comprehend, and effect; the type of capability they prefer to use; and the growth of capability to act and take responsibility at increasingly complex levels. In this work, the implications of Stratified Systems Theory are examined and applied to military organizational settings.

RN 95-14 The effects of stress on judgment and decision making-. An overview and arguments for a new approach, Hammond, K January 1995. (AD A298 615)

This monograph consists of an overview of four principal literatures on the effects of stress on human performance, with specific reference to studies of the effects of stress on human judgment and decision making. The four literatures are: Clinical/social/personality (Literature I), ergonomics/human factors (Literature II), psychophysiology (Literature III), and judgment and decision making (Literature IV). The overview led to the following conclusion: Literature I through III are independent and isolated from one another (with the exception of some connections between Literature II and III; they contain essentially no material from

Literature IV, which in turn includes essentially none of the material. In deed, there is hardly any work directly related to the effects of stress on judgment and decision making. Thus, there are no secure generalizations regarding these effects. Following the presentation of material that supports these conclusions, I first review the current theories of the effects of stress on judgment and decision malting, broadly conceived, from Literature I and III. (Since 1970, roughly 17 theoretically oriented articles have appeared in Literature I and II. Second, I provide brief comments on 10 reviews of the topic. (Ten of the 17 theoretical articles also provided general reviews.) Third, I briefly describe the numerous and varied conditions and operations that have been used to induce stress in empirical studies. Roughly 13 different conditions have been employed as stressors.) Fourth, the psychological/behavioral functions examined under the aforementioned conditions are described. (I organize the various dependent measures that have been employed into eight categories.) Fifth, empirical studies of specific stressors and psychological/behavioral functions are cross-specific stressors and psychological/behavioral functions are cross-tabulated. (A table linking the 13 stressors and the 8 categories of psychological/behavioral functions examined enables the reader to ascertain rapidly which stressors have been studied in relation to which psychological/behavioral functions.) Sixth, the implications of the results are discussed and the status of our knowledge is appraised. (The table alone makes it obvious that our knowledge is scanty, and unevenly distributed over stressors and psychological/behavioral functions.) Finally, in work to be carried out in 1991, I offer a new conceptual framework, address certain methodological issues, and make a recommendation for future research on the effects of stress on judgment and decision making.

RN 95-15 Causal models in the acquisition and instruction of programming skills, Reiser, B. January 1995. (ADA 293 438)

This research project investigates how an interactive learning environment can support students' learning and acquisition of mental models when acquiring a target cognitive skill. In this project, we have constructed GIL, an intelligent tutoring system for LISP programming, and have used GIL to conduct pedagogical experiments on skill acquisition. We have studied two ways in which an interactive learning environment can facilitate students' acquisition of novel complex domains. The first set of studies examines how explanatory feedback, generated from the system's problem-solving knowledge, can facilitate students' learning. The experiments demonstrate computer-based support during learning can help students construct a more effective model for reasoning in complex domains.

RN 95-16 Optimizing the long-term retention of skills: Structural d analytic approaches to skill maintenance, Healy, A.F. January 1995. (AD A293 438)

Progress has been made in determining guidelines for optimizing the long-term retention of skills. Studies on learning and retention of color-word interference, schedule components, list components, mental arithmetic, and vocabulary acquisition suggest that optimal retention will result from using procedures during training, relating information to previous experience, making the information distinctive, promoting direct retrieval of the information, and providing refresher or practice tests.

RN 95-17 People misinterpret conditional probabilities, Hamm, R. January 1995. (AD A293 527)

This final report summarizes the results of the project "The Use of Protocol Analysis and Process Tracing Techniques to Investigate Probabilistic Inference." In probabilistic inference, people use uncertain information to change uncertain beliefs, That is, they must integrate base rate information (about what usually happens) with uncertain information about what is happening in the present. The research shows that the most recently presented information is given undue attention. Further, although subjects recognize that the base rate information in probabilistic inference word problems is relevant, they do not give it enough impact in their considerations. This is not because of their tendency to use available numerical expressions of probability as their response, but because of their inability to interpret conditional probabilities appropriately. Specifically, the subjects think that the conditional probability *p* (evidence/hypothesis), which is given in the word problems and what should be taken as an input to Bayes' Theorem, is *p* (hypothesis/evidence), which is the output of Bayes' Theorem and which is the answer that they are asked to produce. This mistake causes subjects to produce answers that are independent of base rate information.

RN 95-18 Technical and analytical support for the U.S. Army Research Institute, Ruskin, R.S. January 1995. (AD A296 956)

The objective of this contract was to provide technical and analytical support for the conduct of U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) in-house research. Area universities, through their membership in the Consortium of Universities, contributed to a wide variety of research projects and provided various technical and analytical support services. The majority of the support services were provided by Consortium Research Fellows (CRFs), graduate students in the social sciences employed by the Consortium to act as research assistants to the scientists at ARI. Other services provided included sharing the Consortium's faculty expertise database, which allows ARI to search on-line and identify persons with particular expertise, experience, or capabilities necessary to provide assistance on a given research task. ARI was given access to faculty expertise and laboratory facilities at Consortium institutions to cooperate in research projects directed by ARI scientists, and Senior Consortium Research Fellows (SCRFs) provided assistance to ARI. The impact of the Consortium's assistance to ARI has been felt in the increased number of CRFs and SCRFs over the 3-year period, in the increased number of scientific disciplines represented by CRFs over the 3-year period, in the total number of hours worked by Consortium personnel, in the number of ARI scientists who have acted as "mentors" to CRFS, in the number and quality of research publications resulting from professional relationships between contract personnel and ARI scientists, in the use of Consortium personnel for field research, and in the number and variety of outreach activities associated with the contract.

RN 95-19 Cognitive resource theory and the utilization of the leaders' and group members' technical competence, Murphy, S.E.; Blyth, D.; Fiedler, F.E. January 1995. (AD A296 671)

The belief that training leads to improved job performance is often unquestioned. For various reasons, however, research has failed to demonstrate a consistent relationship. Two related experiments investigated the conditions under which technical training for leaders and group members contribute to group performance. The first study compared the effectiveness of decisions in groups in which the leader was (a) instructed to be either directive or nondirective, and (b) given a brief training period to provide task-relevant knowledge for making the required group decisions. A second study compared the performance of trained group members under directive and nondirective leaders. As hypothesized, the leader's technical knowledge or expertise contributed to group performance only if the leader was both trained and directive; group members' task-relevant knowledge contributed to group performance only if the leader was nondirective. The results are discussed in the context of Cognitive Resource Theory.

RN 95-20 Psychological approaches to organized aggression: 2nd final report, Rachman, S. January 1995. (AD A296 671)

The purpose of this paper was to consider whether psychologists are in a position to improve our understanding of and ability to deal with terrorism and its effects. The psychological aspects of terrorism are divided into six categories. The six categories of psychological terrorism are (1) psychological analyses of the terrorist; (2) the nature, timing, and effects of terrorist acts; (3) the behavior during acts of terrorism of terrorists, victims, and negotiators; (4) the prediction and prevention of acts of terrorism; (5) the effects of such acts on victims; and (6) psychological assistance for victims.

RN 95-21 Development of courage in military personnel in training and performance in combat situations, Rachman, S. January 1995. (AD A296 369)

The objective of this study was to investigate the components of courage, to study the development of courage through training to performance, and to identify the distinctive qualities, if any, of courageous people. The study was directed toward the selection, training, performance, and post-tour adjustment of bomb-disposal operators of the Royal Army Ordnance Corps (RAOC).

RN 95-22 Recruitment, retention, wastage and retirement: Career patterns in the officer corps of the British armed services 1970-82, Bellany, I. February 1995. (AD A296 252)

A policymaking tool has been fashioned for those concerned with officer recruitment and promotion policy. The tool is basically a transition matrix with elements that consist of the probabilities in any one year that (a) a civilian will join the officer corps, or (b) a captain will be promoted to major, or (c) a major will exit the service for civilian life, and so forth. The size of the matrix at its fullest is determined by the number of discrete ranks Plus the civilian status-say eleven. The number of elements within it would be 121 (11 x 11), although the value of many of these will be zero, corresponding to the near impossibility in normal times of promotion through more than one rank at a time.

RN 95-23 Examining the effect of information sequence, Adelman, L.; Bresnick, T.A. February 1995. (AD A296530)

This paper describes a recent experiment conducted with Patriot air defense officers and using the Patriot air defense simulators at Fort Bliss, Texas. The experimenters found that, under certain conditions, the participants made different identification judgments and took different engagement actions depending on the sequence in which the same information was presented to them. This finding was consistent with theoretical predictions regarding how operators process information, and the hypothesis that their processing approach (or Heuristic) would result in biased judgments under certain conditions. Future research is directed toward investigating whether display modification can remove the observed judgmental bias. Generally, this experiment demonstrates the applied implications of basic research investigation human information processing, and the importance of understanding cognitive processes when developing computer systems.

RN 95-24 A cognitive architecture for solving ill-defined problems, Holyoak, YJ.; Thagard, P.R. February 1995. (AD A293 582)

A computational theory of analogical mapping is described, based on a small set of constraints. The theory is embodied in a computer simulation that is applied to several examples, including psychological data on the mapping process.

RN 95-25 and 95-26 Canceled.

RN 95-27 Reducing the confirmation bias in an evolving situation, Tolcott, M.A.; Marvin, F.F. February 1995. (AD A293 570)

This report presents the results of Phase 2 research on decision making in an evolving situation. As in Phase 1, the problem context was situation assessment by trained Army intelligence analysts working in pairs. Participants were given an initial battlefield scenario and asked to determine the enemy's most likely avenue of approach and to give their level of confidence; subsequently they were asked to reconsider their decisions after receiving each of three updated intelligence reports that contained some items that confirmed and some that did not confirm their early hypothesis. Finally, the participants were asked to rate each information item in terms of the degree to which it supported or contradicted their hypotheses.

RN 95-28 Integrating analogies with rules and explanations, Nelson, G.; Thagard, P.; Hardy, S. June 1995. (AD A297 315)

This paper presents a new integrated artificial-intelligence model, Connecting Analogies With Rules and Explanations (CARE), which combines analogy, rule use, and the assessment of explanatory coherence. The model is applied to complex problem-solving and decision-making tasks in a variety of domains.

RN 95-29 Canceled.

RN 95-30 Ultradian rhythms in prolonged human performance, Lavie, R; Zomer, J.; Gopher, D. February 1995. (AD A296 199)

This study investigates (1) the occurrence of approximately 14.4 cycles/day ultradian rhythms in the ability to fall asleep during morning and afternoon hours, (2) the phase relationship between these rhythms and the REM-NONREM sleep state rhythms, and (3) the phase relationship between the sleepiness rhythms and ultradian rhythms in perceptual motor performance. Eight healthy males ages 24+2 with normal sleep-wake habits were tested. Each subject, after an adaptation night, spent two 24-hour periods in the laboratory. Subjects began at 1600 a strict 5:15 min sleep-wake schedule that lasted for 8 hours (1600-2400). During each of the 24 5-min sleep attempts, polysomnographic recordings were done and during the 15-min scheduled wake time psychomotor testings were conducted. At 2400 subjects retired for an uninterrupted nocturnal sleep with polysomnographic recordings. Subjects were awakened after 6-7 hours of sleep and a second 3-hour period of the same schedule was initiated. Awakening from nocturnal sleep was timed by the experimenter either from REM sleep (first 24-hr experimental period) or about 25 min after the end of a REM period (second experimental period) for 4 subjects, and the reverse order for the other 4 subjects. Although the average percentages were similar, spectral analysis revealed a different temporal structure of stages 1 and 2. Distributions were bimodal with peaks around 1630 and 2300. The morning distributions were much more episodic, resembling the 90min ultradian rhythmicity reported by Lavie and Scheron (1981). These results suggest that, despite the impressive stability of the morning and evening (accumulated) sleep, the ultradian rhythmicity in sleepiness is nonstationary and is modulated by a circadian cycle. Ultradian rhythms of similar frequency were found in perceptual and motor performance. The rhythms in perception, however, were drastically modified by altering the sampling frequency and were, therefore, attributed to statistical artifact. The rhythms in motor performance, on the other hand, persisted under both sampling frequencies and can therefore be considered a true endogenous rhythmicity. The analysis of the phase relationship between the rhythms in motor performance and physiological indexes of arousal is being performed in our laboratory.

RN 95-31 The relation between group cohesiveness and performance: An integration, Mullen, B.; Cooper, C. February 1995. (AD A296 297)

This paper reports on a meta-analytic integration of the relation between group cohesiveness and performance. Overall, the cohesiveness-performance effect was highly significant and of small magnitude. Several theoretically informative determinants of the cohesiveness-performance effect were examined. This effect was significantly stronger when cohesiveness was operationalized in terms of measurements of group members' perceptions of cohesiveness than when cohesiveness was operationalized in terms of experimental inductions of cohesiveness, The results of this analysis suggest that the more direct effect may be from performance to cohesiveness rather than from cohesiveness to performance. Discussion considers the implications of these results for future research on the relation between cohesiveness and performance.

RN 95-32 Methods of displaying multiple performance measures from simulator exercises, Mahan, R.R April 1995. (AD A298 839)

This report examines the development of a summary display system that would extend the capabilities of the Unit Performance Assessment System (UPAS) in supporting after action reviews conducted in the Simulation Networking (SIMNET) environment. The report details the initial phase of an effort to produce displays that use integral display technology in supporting after action reviews. The report discusses the Cognitive Continuum Theory as a framework that may guide the development of the summary displays. In addition, the findings suggest that general categories of combat unit actions (Move, Shoot, and Communicate) may serve as a set of global dimensions that are well suited for summary display information. Finally, an empirical study is outlined that documents the proposed next step in the summary display system project.

RN 95-33 Effects of personnel turbulence on tank crew gunnery performance: A review of the Literature, Ward, K.J. April 1995. (AD A296 255)

This literature review summarizes studies that examined the effects of personnel turnover and turbulence on tank crew gunnery performance. This literature is compared and contrasted to literature on the performance of flight crews. The findings appear to contradict a widely held belief that it is important to stabilize tank crews during their training.

RN 95-34 Development and construct validation of the situational judgment test, Hanson, M.A.; Borman, W.C. April 1995. (AD A296 511)

This report describes the development of the Situational Judgment Test (SJT), the development and evaluation of basic SJT scores, explorations of the dimensionality of the SJT, and detailed investigations of the relationships between SJT scores and scores on temperament, cognitive ability, and other job Performance measures. The SJT was developed to be a criterion measure of supervisory job knowledge and administered to over 11000 second-tour Noncommissioned Officers (NCOs) in the U.S. Army. These data were used, along with several rational approaches, to explore the dimensionality of the SJT. Relationships between SJT total scores, several experimental SJT subscores, and scores on the other available measures were also examined; and structural modeling was used to test several hypotheses concerning reasons for some of the relationships that were found. Finally, conclusions were drawn, based on the results of these analyses, concerning what the SJT measures.

RN 95-35 The application of propensity score theory to the measurement of the effects of military service, Fairbank, B.A. April 1995. (AD A294 380)

This report focuses on the suitability or propensity score theory to determine the effects of military service on the later life of a Service participants The limitations inherent in the non-experimental determination of the effects of service have previously precluded strong determination of cause, in part because of the bias introduced by self-selection into military service. Those who serve differ from those who do not serve in at least two ways: they have served, and they have chosen to serve. To attribute any differences later in life to the first of those variables while ignoring the second is not defensible. The present selection presents a method of simulating the phenomena so modeled, then illustrates the simulation with a sample execution. The output of the simulation is examined to determine whether plausible values of

the effect of service in the output variables might reasonably be expected to be detected. The differences built into the simulation were recovered, but were not statistically significant.

RN 95-36 Strategic leadership in a changing world order: Requisite cognitive skills, Markessini, J. April 1995. (AD A296 863)

This document reviews the psychological literature for models and taxonomies of human cognition. It examines in some detail 20 such models and taxonomies by 18 theorists over a period of 67 years, from 1923 through 1989. The authors conclude that, while there are a number of interesting models, the scientific community does not have a widely accepted, comprehensive theory of cognition or a theory of learning that allows generalization of learning principles to specified complex tasks. Nor does it appear to have a consensus on the concept of intelligence. Above and beyond those considerations, there is little appearance of common purpose guiding the development of the more recently derived models of cognition. The field is more paradigm-driven than theory-driven. No taxonomy of requisite cognitive skills for executive leadership performance was found. The authors, drawing on an integration of the models and taxonomies reviewed, propose such a taxonomy.

RN 95-37 Canceled.

RN 95-38 Simulation and training for stress environments: A meta-analytic and experimental evaluation, Driskell, J.E.; Mullen, B. June 1995. (AD A297 385)

A vast amount of research on stress and training has been conducted in the past several decades. This research identifies approaches that are potentially effective for stress training, but often produces conflicting results that are difficult to interpret at the narrative level. It also describes a series of meta-analytic studies undertaken as part of a research project to integrate and summarize the research literature on stress training. The technical approach examined those training approaches that the research literature suggests may be effective for enhancing performance under stress, including overlearning, mental practice, stress inoculation training, cohesiveness, team building, and relaxation training. This approach provided the opportunity to gauge, on a quantitative basis, the overall effectiveness of alternative training approaches. Second, it allowed the identification of factors that moderate the effectiveness of these training approaches to determine the most effective means to implement a specific training approach. Finally, this strategy provided precise direction for further research and application.

RN 95-39 Group representation in European armed forces, Harries-Jenkins, G. June 1995. (AD A298 618)

The trends toward the establishment of systems of group representation within Western Armed Forces has raised three important questions. First, to what extent can the European experience be identified as a valid analogue for the military forces of those other countries in which such representation is at present illegal. Second, to what extent can the systems of group representation be equated with conventionally defined trade unions? Third, what is the effect of such systems of representation upon the combat effectiveness of armed forces? A review of the existing European situation indicates that, with the possible exception of Sweden, none of

the established systems can be equated with unionization. The systems can at best be defined as forms of personal associations in which the primary interest of the body is to protect its member.

RN 95-40 Transfer of skills among programming languages, Anderson, J.R. June 1995. (AD A298 506)

The general picture that has emerged from this research is one in which programming skill is to be conceived as translation from one surface representation to another. While the successful student will have this surface representation annotated with rich representation of its functionality, the skill is still specific to the notational details of the representations involved. The initial context for this research was set by two things supported by a prior ARI contract. One of these was the development of a general theory of transfer of cognitive skill, which could be conceived as a modern information-processing rendition of Thorndike's theory of identical elements (Thorndike & Woodworth, 1901; Singley & Anderson, 1989). We showed that the degree of transfer could be predicted by the amount of overlap between knowledge structures in the ACT theory, which proposed that knowledge consisted of both procedural knowledge and declarative knowledge (Anderson, 1993). The other part of the research background for this project was the development of tutors for programming languages, particularly LISP (Andersen, Conrad, & Corbett, 1989). We wanted to generalize our understanding of both tutoring and programming.

RN 95-41 Conflict in the military worldview: An ethnography of an Israeli infantry battalion, Ben-Ari, E. June 1995. (AD A298 509)

This report analyzed the organization of everyday military knowledge through a focus on the "folk" models that members of the armed forces have of "soldiering" and "commanding." These models are of great importance because they are basic points of reference for "what we are" and "what we are trying to do" through which military reality is constructed. Specifically, this report represents an attempt to explore the main assumptions about, and images of, "conflict," the "use of military force," or the "enemy" that are held by soldiers and officers. This essay tackles this set of themes by examining a case study; a battalion of elite infantry reserves of the Israel Defense Forces (IDF). Based on a number of years of participant-observation, the analysis is basically ethnographic in its approach.

RN 95-42 Developing new test selection and weight stabilization techniques for designing classification efficient composites, Johnson, C. D.; Zeidner, J.; Scholarios, D. July 1995. (AD A298 740)

The major goal of this research was to specify a classification-efficient methodology for the construction of assignment composites of optimally selected and weighted tests drawn from a single battery of ASVAB and experimental tests and targeting a job family. The experiments examine the effects of the number of tests included in a composite, using different figures of merit as the standard for the selection of tests for components and stabilizing test regression weights. The research approach adopted involves a simulation of the Army selection and classification process using Project A validity data. Comparisons of classification efficiency

obtained under each experimental condition are reported in terms of mean predicted performance (MPP). Findings indicate that five-test composites, tailored to operational job families and selected by a predictive validity index to provide positive weights, can provide an acceptable approximation of the maximum obtainable MPP. The results confirm the predictions that the use of efficient test selection procedures and least square weights for tests in assignment composites can improve the utility of the Army assignment process. The results show that optimal classification provides twice as much gain in predicted performance as gain from selection alone.

RN 95-43 Differential assignment theory sourcebook, Johnson, C.D. and Zeidner, J. July 1995. (AD A298 629)

Differential Assignment Theory (DAT) is presented as an alternative to other current theories that pertain to personnel selection and classification, but, unlike DAT, do not provide a basis of optimism for the successful development and implementation of both selection and classification-efficient operational systems. Data focuses on the research and development of systems that can effectively accomplish: (1) selection from a common pool of applicants, and (2) the subsequent optimal assignment of selected individuals to one of a number of alternative job families. The other theories at least implicitly assume that separate applicant pools exist for each assignment destination, thus permitting the evaluation of test batteries and assignment composites in terms of incremental predictive validity, essentially ignoring the effect of the intercorrelations among selection and assignment variables. DAT is described in terms of its assumptions, concepts, and the more than 30 principles that have been hypothesized and partially tested within the context of research on DAT relevant to selection and /or classification of personnel. The authors believe that true or more accurate descriptions of the interrelations among selected variables particularly relevant to selection and classification of personnel, including system, predictor, and criterion variables, are reflected in these principles. This report provides a source of such facts and concepts useful to the design of both research efforts and operational systems that have potential for the improvement of selection and/or classification policies, strategies, procedures, and total systems.

RN 95-44 Battalion - battle staff training system, Andre, C.; Salter, M.S. August 1995. (AD A299 228)

This report documents the design and development of 13 courses of instruction for the Battalion-Battle Staff Training System (BN-BSTS). BSTS is a set of training materials for battalion-level staff officers, a mixture of text and CD-ROM computer-based instruction (CBI). Designed for stand alone or local area network linked training systems, the BN-BSTS was developed for use by the U.S. Army National Guard (ARNG). Part of the training challenge for ARNG combat arms staff members is due to conflicts with other duties. To help alleviate this problem, distributed, multimedia (paper-based and computer based), individualized instruction for battalion staff personnel was developed. The resulting BSTS project provides a prototype staff officer training program with courses which cover individual battalion staff functional areas and those individual tasks required to prepare the battle staff members for collective battle staff tasks. This project, sponsored under the Advanced Research Projects Agency (ARPA) program umbrella of Simulation in Training for Advanced Readiness

(SIMITAR), is coordinated with two other programs: Simulation-Based Multiechelon Training for Armor Units (SIMUTA) and Combat Service Support (CSS) Training System Development for the National Guard.

RN 95-45 Validation of crew coordination training and evaluation methods for Army aviation, Simon, R.A.; Grubb, G.N. August. 1995. (AD A298 921)

At the request of the U.S. Army Aviation Center (USAAVNC), the Army Research Institute Rotary-Wing Aviation Research Unit (ARI RWARU) developed field exportable training and evaluation materials for aircrew coordination. A testbed of the materials was implemented with the cooperation of the 101st Aviation Brigade. Sixteen aircrews participated. Using an UH-60 flight simulator, aircrews were evaluated while executing a comprehensive tactical mission. Evaluation data were collected before and after aircrew coordination training was provided. Evaluation measures included attitude, behavior, task performance, and mission performance. Results showed that (1) the training had positive effects on all of the measures, and (2) the measures are sensitive to changes in performance. The impact on safety of flight was also assessed. The report concludes with recommendations and suggested areas for future research.

RN 95-46 Individual differences in the generation and processing of performance feedback, Herold, D.M.; Parsons, C.K; Rensvold, R.B. September 1995. (AD A299 049)

In this paper, we identify domain-specific measures of individual differences in feedback propensities. In a series of studies, we identify the primary dimensions, psychometric characteristics, and construct validation evidence for internal ability, internal propensity, and external propensity for feedback. Confirmatory factor analysis supports the three-dimensional representation. Correlations between the new scales and existing differences of personality are consistent with theoretical predictions. Research that has used the new scales to predict feedback-related behavior and performance is described. Theoretical and practical extensions of the current work are discussed.

RN 95-47 Perceptual learning in the acquisition of flight skills, Lintern, G. September 1995. (AD A299 520)

Many skills transfer effects observed in flight training research may be explained by an appeal to invariant perceptual properties of the task environment. If training in a simulator serves to enhance sensitivity to perceptual properties that are critical to flight performance, a high level of transfer will result. The theory forwarded here assumes that a relatively low-dimensional set of properties supports flight control. It is those properties that need not be represented accurately, or even at all. One implication of the approach outlined here is that the unquestioning pursuit of high fidelity is, in large part, wasted effort.

RN 96-01 Acquisition and processing of information during states of REM sleep and slow-wave sleep, Mollon, J.D. October 1995. (AD A300 352)

Review, analysis, and summary of experimental literature on "sleep learning." Findings include: (1) Serious methodology flaws found in all reported positive results. No evidence that semantic learning occurs when verbal material is presented to sleeping subjects. (2) A critical but open-minded test of sleep learning has not been done. Recommendations made for an appropriate experiment. (3) If novel material is presented to the sleeping subject, there is danger that it may interfere with normal nighttime processing of earlier, daytime experiences. (4) It is possible that external stimuli could be used to prompt and direct information processing during sleep to favor one set of material in preference to others. This could apply to skill learning as well as declarative memory with considerable potential relevance to soldier training.

RN 96-02 Effects of early decisions on later judgments in an evolving situation, Tolcott, M.; Freeman, E; Lehner, M.; Lehner, P. October 1995. (AD A301 079)

Army intelligence analysts were given a realistic battlefield scenario and asked to make preliminary decisions about most likely enemy avenue of approach, and their confidence level. Subsequently, they were asked to reconsider their decisions in the light of updated intelligence reports containing some items which confirmed and some which contradicted their early decisions. Three such updating judgments were requested. Finally, they were asked to rate each information item in terms of the degree to which it supported or contradicted their hypothesis.

RN 96-03 An approach to identifying future brigade tasks: Addendum, Dressel, J.D. October 1995. (AD A301 137)

This Research Note describes the continuation of earlier research (Research Report 1655, ADA 275686) on an approach to collect Brigade training information from military experts. The current research permits experts to speculate on the future role of the Brigade and identify areas which would require training emphasis to prepare the Brigade to fulfill this role. Preliminary training implications and conclusions about the approach are presented.

RN 96-04 Decision-making with long-term consequences: Temporal discounting for single and multiple outcomes in the future, Stevenson, M.K October 1995. (AD A301 353)

The consequences of a decision may be characterized as positive or negative, certain or uncertain, and as immediate or deferred. The first two attributes have been studied extensively The impact of future consequences has received much less attention and is the focus of the current studies. Although temporal discounting is expected, by most normative models, to occur as a function of time, an empirical comparison of the discounting function, applied to singular and multiple outcomes described in this paper, contradicts this expectation in one domain.

RN 96-05 Rifle company performance at the joint readiness training center: Analysis of take home packages, Salter, M.S. October 1995. (AD A303 796)

This research is a part of a multi-year program designed to increase unit combat performance capability by identification, development, and evaluation of improvements in home station preparation for combat. The focus here is on Light Infantry company level performance at the Joint Readiness Training Center (JRTC) through content analysis of the Take Home Packages (THPs). Recurrent patterns in strengths and weaknesses are shown for 45 rifle companies, from 15 battalions which rotated to JRTC in the FY89-FY91 time frame. Overall morale and willingness to learn were high. However, problems in performance occurred throughout all phases of Light Infantry missions. Results showed that continuing emphasis in training was needed on troop leading procedures and all phases of preparation for combat. Maintenance of operational security was a problem for the units in conduct of JRTC missions. Further problems occurred in actions on contact/on the objective, and throughout the command, control, and communications process. Difficulties in using the THPs as a basis for analysis were noted and will be used in JRTCs continuing effort to upgrade and improve the THPs as user feedback.

RN 96-06 Theories, methods, and tools for the design of user-centered computer systems, Fischer, G.; Kintsch, W. October 1995. (AD A305 244)

The goal of this research at the general level is to develop theories, methods, and tools for the design of user-centered computer systems, and at the specific level to design, implement, and evaluate a customizable Personalized Intelligent Retrieval system. Our research is based on the basic hypothesis that the following duality exists: (1) user-centered system design cannot be done and understood without trying to test existing ones, extending existing ones, and designing new ones, and (2) user-centered system design cannot be understood by just doing it. The system building efforts must be based on a deep understanding of the theoretical and methodological issues behind them, derived primarily from cognitive science, and, as far as evaluation is concerned, from human factors/cognitive ergonomics.

RN 96-07 General principles for an intelligent tutoring architecture, Anderson, J.R.; Corbett, A.; Fincham, J.; Hoffman, D.; Pelletier, R. November 1995. (AD A305 174)

This report describes the major outcome of our research project which has been a set of ideas for developing intelligent tutoring systems and an architecture for implementing these ideas. The approach is built around developing a production system model of the skill being taught. Declarative instruction is built to communicate the production rules, a model tracing methodology is implemented to monitor their learning, and a knowledge tracing methodology is implemented to guarantee their mastery. The multiple programming languages project was an attempt to build a single architecture based on these ideas which was capable of teaching many different programming languages. It has been used so far to teach LISP, prolog, and Pascal at CMU, and NYNEX has adapted it to teach COBOL. Current research is aimed at building tools to extend this architecture to an authoring system for intelligent tutors generally.

RN 96-08 Battle Staff Effectiveness (BSE) observer/controller training: Observations of prototype course, Valentine, RJ.; Thompson, TJ. November 1995. (AD A305 384)

This research note describes the development and evaluation of the Battle Staff Effectiveness Observer/Controller (O/C) Training Program of Instruction. The pilot presentation of the Battle Staff Effectiveness Observer/Controller Training Course provided an opportunity to obtain expert constructive criticism. Limited availability of the O/Cs did not permit a full evaluation of the complete 5-day Program of Instruction (POI). The unevaluated portion of the POI consists primarily of practical exercises. It is recommended that further refinement and pilot presentation be conducted to enhance the prototype POI that is attached.

RN 96-09 Emergency team coordination course ™ phase one report, Simon, R.A.; Morey, J.C.; Locke, A.M.; Blair, E. November 1995. (AD A306 894)

This research investigated the feasibility of transitioning the crew coordination training developed for Army aviation to emergency department (ED) teams in civilian and military hospitals. Medical malpractice literature and field observations identified areas for teamwork improvement. Team dimensions were formulated, and behaviorally anchored rating scales of teamwork behavior were developed for team evaluation and curriculum development. A 1-day Emergency Team Coordination Course ™ (ETTC) training program based on a philosophy of evaluation-driven instruction was developed that included lecture, discussion, and practical exercises to teach team skills. Evaluation instruments were administered, and the course was presented to staff at a Level H trauma center. The major conclusion was that the ETTC ™ offers a significant contribution toward meeting the need for improving efficiency and enhancing the quality of emergency care. The course tryout led to other conclusions and recommendations for improving the curriculum content and meeting the time and resource constraints associated with training ED staffs. The results demonstrated that the principles and methods of the Army aviation crew coordination training can be translated into the domain of ED teams. Full-scale curriculum development and validation are recommended.

RN 96-10 Exploring psychological and behavioral qualities of Islamic fundamentalism and terrorism, Taylor, M. November 1995.

This research explores psychological and behavioral issues to help understand contemporary developments in Islam. Emphasis is on the behavioral bases of the relationship between Islamic Fundamentalism and violence. General issues related to the concept of fundamentalism are discussed. Then, fundamentalism within the context of Islam is considered, emphasizing the nature of fundamentalist ideology and ways of understanding the processes of fundamentalism within a behavioral framework, particularly religious and ideological control of behavior. Specific circumstances analyzed are those prevailing in the Republic of Sudan.

RN 96-11 Practical thinking: Review of cognitive instruction programs for battle command, Fallesen, J.J.; Pounds, J.; Breeskin, S.; Saxon, T January 1996. (AD A304 932)

ARI developed a program of instruction on thinking, reasoning, and decision making at the request of the Training and Doctrine Command and the Command and General Staff School. Approaches to cognitive instruction are reviewed in the report. The findings support the adoption of a cognitive skills approach, but the benefits of the previous programs have not

always been well established. The 15 programs that were reviewed identify various cognitive and metacognitive skills, attitudes, heuristics, and tools that were applicable to a curriculum for Practical Thinking. None of the previous programs were developed for application to specific job domains, and only two included adults in the targeted training audience. The review shows that previous Programs have not been applied to specific career or job tracks, including Army leadership positions.

RN 96-12 Exploratory research on African American youth's propensity to join the military, Hughes, A.O.; Khatri, D.S.; Savell, J M. January 1996. (AD A307 050)

In this preliminary and mainly qualitative research effort we sought information about factors potentially affecting African-American youths interest in joining one of the military services after high school. Each of 100 African-American high school juniors and seniors was individually interviewed by a male or female African-American adult whom the students were said to know and like. The interviews were conducted at a large city high school that was mostly Black. While the results of this effort are interesting in their own right, their primary values were to suggest variables to examine in a projected effort to model African-American enlistment propensity.

RN 96-13 Canceled. See TR 1040.

RN 96-14 The development of knowledge elicitation methods for capturing military expertise, Klein, G.A. January 1996. (AD A306 885)

The goal of this SBIR Phase II was. to formalize and evaluate a new method of knowledge elicitation, the Critical Decision Method (CDM). A number of studies were conducted using the CDM, and a formal rationale, description, and set of guidelines was developed. Additional work demonstrated the reliability of the method. The CDM was shown to be applicable in Army command-and-control settings. Additional knowledge elicitation methods were developed for team decision making during command-and-control training exercises and for the evaluation of decision support systems. Taken together, the projects performed under this contract exemplify a new discipline of cognitive engineering. They provide a set of methodologies for eliciting and codifying expert domain knowledge to generate systems that improve decision making

RN 96-15 Military command decisionmaking expertise: Final report, Deckert, J.C.; Entin, E.B.; Elliot, E.; MacMillan, J.; Serfaty, D. January 1996. (AD A306 801)

This report describes the development and validation of a theoretical framework for the investigation of tactical decisionmaking expertise. The theoretical framework was developed based upon interviews with U.S. Army command decisionmaking experts and a review of the literature on expertise. The primary means of validation was the conduct of a set of scenario-driven experiments using as subjects Army officers ranging in rank and experience from captain through General Officer. Three retired General Officers rated the level of expertise of 46 subjects independently based upon written products and videotapes. Nonmilitary researchers used the same set of products plus questionnaires to independently score a set of

objective measures derived to test aspects of the theoretical framework. The three expert judges showed remarkable consistency in their independent ratings of the expertise level of the subjects. Many of the objective measures correlated with the experts ratings. The objective measures did not, however, account for a significant enough portion of the variance to be, by themselves, reliable incidents of expertise. Suggestions for further research directions are presented in the conclusions.

RN 96-16 Decision making under uncertainty and time stress, Leddo, J.; O'Connor, M.; Doherty, J.; Bresnick, T January 1996. (AD A306 834)

Tactical decision making occurs in environments characterized by high uncertainty, high-valued outcomes, and time stress. The critical relation of decision outcomes to uncertain events pushes decision makers to resolution of uncertainty. Time stress, however, works in the opposite direction, precluding ideal planning efforts. It is thus crucial to systematically characterize the impacts of uncertainty and time stress on tactical decision malting to facilitate the design of decision aids that will be effective in the environments described. The present study employs a theoretical framework that extends Kahneman and Tversky's prospect theory (1979) to goal-directed decisions such as those involved in battlefield tactical decisions. The framework is used to provide a basis for characterizing the critical issues involved in such environments and to design decisions aiding concepts based on studies employing the framework. Four studies were conducted.

RN 96-17 Pattern recognition training for combat leaders: Sample training program, Thronesbery, C.; Sullivan, B.D.; Rhoads, R. January 1996 (AD A320 895)

Lesson plans were developed to facilitate and increase pattern recognition for combat leaders, following an overview of the pattern recognition approach to training. This report contains a demonstration package that illustrates implementation of the pattern recognition approach to training. An extensive set of storyboards offers instructional material covering enemy situation understanding from an elementary to an advanced level. It incorporates the development of key pattern concepts that are used in threat evaluation during Intelligence Preparation of the Battlefield. The remonstration materials additionally provide training for Soviet tactical considerations of a motorized rifle regiment during two tactical scenarios.

RN 96-18 Part-task performance measures, Layton, R.L.; Feld, P January 1996. (AD A307 049)

The purpose of this Phase I SBIR project was to define and independently evaluate a subset of Army division-level command and control performance measures derived from the Army Command and Control Evaluation System (ACCES). The subset was measures which either directly or indirectly measure planning performance. The evaluation involved a determination of the degree to which this subset agreed with the overall ACCES evaluation of a division's planning performance and with battle outcomes. The intent was to help determine if this measurement subset was sufficiently robust to be applied independently in the laboratory to assist in evaluating planning aids. The subset was used to evaluate the performance of the G3

Plans section of a U.S. Army division during a large-scale command post exercise. The results are contained in this report.

RN 96-19 A 50-year prospective study of the psychological sequelae of World War II combat, Lee, K.A.; Vaillant, G.E.; Torrey, W.C.; Elder, G.H., J -. February 1996. (AD A319 601)

The authors take advantage of a 50-year prospective study of World War II veterans to examine the predictors and correlates of combat exposure, Post-traumatic Stress Disorder (PTSD) symptoms, and trait neuroticism (NEO). The subjects were 107 veterans who had been extensively studied before and immediately after serving overseas in World War II. All served as members of the study until the present time, and 91 filled out both questionnaires of PTSD symptoms and neuroticism. In this study group variables associated with positive psychosocial health in adolescence and at age 65 predicted combat exposure. Combat exposure and number of physiological symptoms during combat -- but not during civilian stress -- predicted symptoms of PTSD in 1946 and 1988. Combat exposure also predicted early death and study attrition. Psychosocial vulnerability in adolescence and at age 65 and physiological symptoms during civilian--but not during combat stress-predicted trait neuroticism at age 65. Combat exposure predicted symptoms of PTSD but not nonspecific measures of psychopathology. Premorbid vulnerability predicted subsequent psychopathology but not symptoms of PTSD.

RN 96-20 Attrition revisited: Identifying the problem and its solutions, Laurence, J H.; Naughton, J.; Harris, DA February 1996. (AD A309 172)

This report highlights the known and suggested causes, correlated, and contributors to first-term enlisted attrition. Personal characteristics such as education credential, aptitude, gender, and age are discussed first followed by a description of organizational and situational influences. Better coordinated multivariate selection approaches to attrition are suggested as are realistic previews of military life. A pivotal factor in attrition is its management/policy control at various levels. This aspect of attrition must be understood before other reduction strategies are introduced.

RN 96-21Tutoring: Guided learning by doing, Merrill, D.C.; Reiser, B.J.; Merrill, S.; Landes, S. February 1996. (ADA309 385)

Individualized instruction significantly improves students' pedagogical and motivated outcomes. In this paper, we seek to characterize tutorial behaviors that could lead to these benefits and consider why these actions should be pedagogically useful. This experiment examined students learning LISP Programming with the assistance of a tutor. Tutoring sessions we audiotaped, allowing us to analyze every verbal utterance during the sessions and thereby identify the conversational events that led to pedagogical success. This discourse analysis suggests that tutors are successful because they take a very active role in leading the problem solving by offering confirmatory feedback additional guidance while students are on profitable paths and error feedback after mistakes. However, tutor carefully structure their feedback to allow students to perform as much of the work as possible while ensuring that

problem solving stays on track. These results suggest the types of strategies tutors employ to facilitate guided learning by doing.

RN 96-22 Further research on Psychological analyses of courageous performances in military personnel, Rachman, S.J. February 1996. (AD A309 078)

The aim of the research was to gain an increased understanding of the nature of courageous performances and the way in which it can be promoted. The practical objective was to develop methods for practicing courageous performances. Military personnel who have to perform hazardous duties were studied before and after training, during operational duties, and under laboratory stress. Various measures were used to assess their behavior, subjective reactions, and psychophysiological responses. The bulk of the research was carried out on military bomb-disposal operators, and supplementary studies were carried out on veterans of the Falklands war and on soldiers undergoing parachute training. The results of the studies include: confirmation of the significant and positive psychological effects of the training procedures, the cumulative effects of operational duty on levels of confidence and skill, the psychological differences between experienced and inexperienced operators, the psychological problems that arise during operations, and the aftereffects of a tour of active duty.

RN 96-23 Canceled.

RN 96-24 leadership, resources, and performance in two Army National Guard battalions, Siebold, G.L.; Browning, H.W Jr. February 1996. (AD A309 089)

The National Guard Bureau designed the project "Robust Test" to assess the readiness impact over time of differing levels of full-time training support personnel and increments of additional training assemblies in eight combat companies. The U.S. Army Research Institute for the Behavioral and Social Sciences helped by assessing the impact of these differing levels of resources on leadership, motivation, and unit cohesion. Data showed soldier-reported levels of motivation, cohesion, and leadership in the Guard companies were high but within the ranges of Active Component units. The leadership and squad teamwork in each company correlated strongly with company overall readiness. The fully resourced companies reported the highest or among the highest levels of motivation, cohesion, leadership, and climate.

RN 96-25 Occupational analysis and job structures, Statman, M.A; Gribben, M.; Harris, D.A.; Hoffman, G.R. February 1996. (AD A309 141)

The objective of this study was to review the major issues and trends in job family research and to develop a method for evaluating the quality of job cluster structures. The proposed cluster evaluation method consists of the following four components: (1) internal validation, (2) consistency analysis, (3) external comparisons and (4) validation against an external criterion. Four Army databases containing job analysis information were used to test the evaluation method. Clusters were formed by three empirical procedures: (1) Ward hierarchical cluster analysis (HCA), (2) average linkage HCA, and (3) K-means partitional clustering. The method was useful in constructing job clusters, evaluating their consistency across clustering procedures and samples, and in malting external comparisons with other job

family structures. It can be applied to any cluster structure evaluation problem, specifically, in the present context, to constructing new job families, developing task clusters for structuring and restructuring jobs, and evaluating the quality of existing cluster structures.

RN 96-26 Conceptual capacity and officer effectiveness, Lewis, P.M. February 1996. (AD A309 085)

Individual differences in conceptual capacity were explored in an opportunity sample of 44 War College students. Replicating earlier findings, War College students demonstrated a range of conceptual capability, in particular with respect to breadth of perspective (Keagan, 1994) and conceptual work capacity (Jaques, 1989). Ratings of these two conceptual capacities were once again found to be positively correlated, and conceptual work capacity was positively correlated with War College instructor ratings of strategic thinking skill but not rated peer popularity. Interrater reliability of the two conceptual capability measures was established. Implications of these findings for leader assessment and development were discussed.

RN 96-27 The effect of stress inoculation training on anxiety and performance, Saunders, T; Driskell, J.E.; Hall, J.; Salas, E. February 1996. (AD A309 082)

The development of effective training procedures to prepare the individual to resist the negative impact of stress is of considerable interest to government and industry. Stress inoculation training is a cognitive-behavioral stress intervention that has shown considerable promise; however, a number of questions arise regarding the application of this clinically based approach to more applied settings. A meta-analysis was conducted to determine the overall effectiveness of stress inoculation training and to identify conditions that may moderate the effectiveness of this approach. Results indicated that stress inoculation training was an effective means for reducing performance anxiety, reducing state anxiety, and enhancing performance under stress. Furthermore, the examination of moderators such as the experience of the trainer, the type of setting in which training was implemented, and the type of trainee population revealed no significant limitations on the application of stress inoculation training to normal training environments.

RN 96-28 Functional test example for distributed interactive simulation, Heiden, C.K; Sever, R.; Smith, P; Throne, M. February 1996. (AD A309 129)

Functional tests serve to document and verify the anticipated functionality of a system prior to formal testing. Shortcomings in projected functionality may severely compromise the results of developmental and operational testing as well as undermine efforts to improve and acquire the needed functionality anticipated with these systems. Although much of the Army's current system testing is being conducted in virtual simulation such as the Distributed Interactive Simulation (DIS) environments, methods for conducting functional tests in DIS are not well documented. This report provides a detailed example of the method and tools used to perform a functional test of a digital command and control system in DIS-based virtual simulation. This example includes detailed functional checklists for specific system components and for generic DIS-based simulators, semiautomated forces, and supporting test bed utilities. The application of such functional test methods should improve Army testing and

assist in determining the functionality needed to attain and sustain anticipated military capabilities.

RN 96-29 An application of the high transfer training methodology with soft skills tasks?, Ryan, A.J. III March 1996. (AD A309 565)

The High Transfer Training (HITT) methodology is an extension of the Systems Approach to Training (SAT) that seeks to produce training Programs that directly promote transfer of learning. The HITT method adds steps to SAT that identify and codify similarities and differences among objects and then clusters them according to the common skills and knowledge required by the student to operate upon these objects. The HITT procedure thereby aids the training developer in producing generic learning objectives defined at an optimum level of specificity for transfer The effect of the course developed based on the HITT method exceeded the trainer's expectations. This development effort was, however, highly equipment specific, making the application HITT suspect to being constrained to hard skills applications only This report describes the application results of HITT to the training of soft skills tasks at the Ordnance Advanced Noncommissioned Officers Course. The results show that the HITT methodology can be used in all training development efforts. In fact, the EM methodology is perhaps best suited to training developments in the soft skills area where proficiency with generalizable skills and knowledge are crucial to successful job performance.

RN 96-30 Enhancing cognitive performance by information management techniques, Breznitz, S.; Ben-Zur, H.; Vardi, N. March 1996. (AD A309 122)

Ten experimental groups totaling 200 subjects were given free recall tasks with different information about list length. Manipulations consisted of exact information, discouraging information, and no information, as well as information on route, and encouraging and discouraging disconfirmation during the task proper. Information management principles that were effective in enhancing endurance of stressful tasks were successfully applied to the area of free recall. Information conditions significantly affected performance. The conceptual framework focusing on the role of information in determining expected effort, resource mobilization, and within tasks resource allocation, was found useful in generalizing from earlier studies that enhanced endurance, to the present one. It suggests a variety of potentially effective interventions aiming at maximizing performance.

RN 96-31 Educating and motivating leaders for the 21st century, Preczewski, S.C.; Caplow, J.A.H.; Donaldson, J.F. March 1996. (AD A309 012)

The purpose of this research was to compare a cur-rent instructional approach used in one course, C51: Strategic, Operational, and Joint Environments, of the Command and General Staff Officer Course (CGSOC) to an alternative instructional approach derived from the Problem-Based learning (PBL) approach. Specifically, this research sought to determine if. (1) a cued retrieval instructional strategy in a problem-oriented instructional situation would foster encoding specificity, hence, retention; and (2) a focus on identification of learning issues by participants would foster an orientation to self-directed, continuing learning.

RN 96-32 Testing and refining a core theory of human plausible reasoning, Collins, A.; Burstein, M.; Baker, M. March 1996. (AD A308 778)

This report contains two papers prepared during the last year of the contract. The first paper details our extensions of a formal theory of human plausible reasoning, and the second paper is an overview of the theory and experimental work that appeared as a book chapter.

RN 96-33 Perceptual-motor control in human-computer interaction, Nilsen, E.L March 1996. (AD A309 859)

This report isolates and examines some of the emergent perceptual-motor issues raised by the new style in human-computer interaction. It concerns the use of a mouse to select commands from menus. Herein, I describe the physical and perceptual characteristics of the menus and selection procedures to be studied. I also cover research from both the motor-control and the human-computer interaction literature that applies to perceptual and motor aspects of menu selection.

RN 96-34 Situation assessment and hypothesis testing in an evolving situation, Tolcott, M.A.; Marvin, FE; Bresnick, T.A, March 1996. (AD A309 124)

This research investigated the effects of early judgment on (1) the handling of new information, some of which confirmed and some of which contradicted the early judgment, and (2) the selection of hypothesis-testing indicators. The context was situation assessment by Army intelligence analysts during an evolving battlefield scenario. Unaided analysts typically ignored or underweighted contradictory evidence; their confidence in their early judgment tended to rise. A second group was given a brief tutorial on common decision biases, and graphic displays that fostered awareness of uncertainty; in this group the tendencies were reduced (but not eliminated), and one-half of the group reversed their judgment at least once. A third group selected indicators; however, in the face of balanced feedback, their confidence remained constant rather than rising. The findings support the extension of confirmation bias theories to trained personnel performing realistic tasks. In addition, the results suggest that when decision makes the indicators they believe to be important, they pay more attention to contradictory evidence than when they are the passive recipients of new information.

RN 96-35 Canceled.

RN 96-36 Recognition-primed decision strategies, Klein, G.; Crandall, B. March 1996. (AD A309 570)

We describe activities conducted during a 3-year basic research contract that has its goal extension and examination of a Recognition-Primed Decision (RPD) model of decision malting. The RPD model describes a decision strategy commonly employed by proficient Personnel called upon to make decisions in Operational settings by high risk, time constraints, and ambiguous or incomplete information. Work was organized around three areas of interest: (1) evaluation of the relative strengths and weaknesses of the RPD strategy, (2) examination of the nature of stimulation assessment in C2 environments, and (3) exploration of techniques for

supporting decision malting in operational environments that are consistent with the RPD framework. The report contains descriptions of nine studies (seven empirical, two analytical) conducted to examine these issues. One important outcome of the research has been to advance understanding of the role of mental simulation indecision malting. We have developed a detailed mode of mental simulation, including an account of how mental simulation serves as a source of power for a variety of cognitive functions. Work performed under this contract has helped to establish naturalistic decision making as an important and unique perspective.

RN 96-37 Modelling terrorist behavior: Developing investigative decision making through the analysis of empirical databases, Canter, D.; Wilson, M.; Smith, A. March 1996. (ADA310051)

This report outlines further developments in the behavioral modelling and elucidates further developments m the theoretical underpinning of this project, which is aimed at developing multidimensional models of hostage-taking interactions to predict outcome from Patterns of interrelated behaviors observable during an incident. In addition to the continued analysis of actions observed during terrorist hostage taking, the theoretical psychological rationale of the models produced has been greatly advanced. As the models of behavior are developed, it is seen as particularly important to drive their evolution with sound psychological theory.

RN 96-38 Bending the power law: The transition from algorithm-based to memory-based performance, Rickard, T.C March 1996. (AD A310 224)

Two theories of tasks that exhibit a transition from algorithm-based to retrieval-based performance were compared. The instance theory of automaticity assumes parallel strategy execution and instance-based memory representation and predicts power function reduction in mean reaction time and standard deviation of mean reaction time (SD) with practice. An alternative theory is proposed that assumes nonparallel strategy execution and strength-based memory representation and that predicts, among other things, power function speed-up and reduction in SD within each strategy, and systematic deviations from power functions in both of these variables when strategy transition occurs. Two of these experiments employing pseudoarithmetic are reported. The results of these experiments are consistent with the new theory that assumes nonparallel strategy execution and strength-based memory representation. These results also constitute the first convincing demonstration of a class of adult skill acquisition tasks for which the power law of practice does not apply overall, a finding that should have notable implications for a variety of human skill acquisition theories.

RN 96-39 Canceled.

RN 96-40 Graphical representations and causal models in intelligent interactive learning environments, Reiser, B.J. March 1996. (AD A309 569)

This research project investigates how an interactive learning environment can support students' learning and acquisition of mental models when acquiring a target cognitive skill. In this project, we have constructed GIL, an intelligent tutoring system for LISP programming,

and have used GIL to conduct pedagogical experiments on skill acquisition. Progress in the current year includes extensions to GIL's graphical representation and model tracing capabilities. The experiments run this year include a study of how GIL's graphical representations facilitate learning for complex programming skills and how GIL enables students to engage in a more natural reasoning than the traditional text-based representation of the programming language.

RN 96-41 Managing situation induced stress in military units, Pereira, O.G.; Jesuino, J.C. March 1996. (AD A309 631)

An experimental leadership under stress course for voluntary Navy 1st lieutenants took place during 2 weeks, in June-July 1992, and was the final empirical test for a model course, constructed along the present project. The rationale and step-by-step approach were detailed in the previous interim report. A combination of lectures, individual and group assignments, and active teaching techniques were used in different stress loads to convey new concepts, change attitudes, train skills, and develop a personal leadership model and style. The results were positive and encouraging; the model can be generalized to other military (or civilian) contexts. It is recommended that the course should be content and task specific and restricted to the operational level of leaders prone to work under stress, of the same rank, age, and background, to be more effective. A 3week course would be ideal. A "trouble-shooting guide' for trainers is included.

RN 96-42 Discriminative environmental properties in terrorist environments--A basis for training, Taylor, M. March 1996. (AD A309 460)

This final report describes a series of three interrelated studies addressing the nature of cues predictive of ambush or terrorist threat available to security force personnel in terrorist environments. The studies were (1) Eighty four actual or attempted ambush situations were reconstructed through interviews with police participants, analysis of records, etc. in Northern Ireland; (2) One single incident involving the eventual arrest of two RAF terrorists in the Netherlands was reconstructed and analyzed in detail through interviews with police participants, records, etc.; (3) A series of observational analyses and experimental simulations were undertaken of selected examples of police patrol work in the Republic of Ireland. The studies are analyzed, presented, and discussed within a behavioral framework, drawing of the conceptual approach known as the rationale Choice Perspective. Pólice behavior in hostile environments is characterized as being under the discriminative control of critical environment cues, and the studies presented are analyzed in terms of the availability of cues to participants. Contrasts are made in terms of the process of control between rule governance versus immediate contingency control.

RN 96-43 Investigations of naturalistic decision making and the recognition-primed decision model, Klein, G.A; Calderwood, R. March 1996. (AD A310 303)

This monograph reviews 3 years of research concerned with how experienced personnel make decisions in operational settings characterized by real-time information processing, shifting goals, and high-risk consequences. The study method combined field studies with

experiments designed to test specific hypotheses Study domains were selected so that findings would have high potential for generalizing to military command-and-control decision making. Critical decision interviews were carried out with experienced personnel, including urban fire ground commanders, wildland fire incident commanders, and U.S. Army tank platoon leaders. Interviews were designed to elicit information on the cues, goals, and option evaluation strategies used by these personnel. Based on these interviews, the relationships among such factors as time pressure, experience level, and group interactions were explored.

RN 96-44 Communication and problem solving in diverse groups: A comparison of electronic meeting systems' use in dispersed and face-to-face settings, Chidambaram, L.; Igbaria, M. March 1996. (AD A310 049)

The hybrid nature of an electronic meeting system (EMS)--as a communication medium and as a manager of diversity--offers organizations an excellent vehicle for improving group performance, handling stress, and building cohesive teams. This report describes a project that examined the performance and behavior of various decision making groups using an EMS in face-to-face and dispersed settings. Results of this study suggest that the proper task-technology-team fit is a critical factor in determining outcomes. In other words, homogeneous groups needing to discuss issues and resolve ambiguities may require face-to-face meetings, while diverse groups may be able to accomplish the same tasks in dispersed settings using an EMS. However, where the goal is information exchange and uncertainty reduction, lean media such as dispersed EMS may be used just as effectively as any other media by all groups, regardless of their degree of diversity.

RN 96-45 Building and retaining the career force: New Procedures for accessing and assigning Army enlisted personnel--Annual report, 1993 fiscal Year, Campbell, J.P. and Zook L.M. (Eds.) March 1996. (AD A309 090)

The Career Force research project is the second phase of an Army Program to develop a selection and classification system for enlisted personnel, based on expected future performance. In the first phase, Project A, a large and versatile database was collected from a representative sample of Military Occupational Specialties (MOS) and used to (1) validate the Armed Services Vocational Aptitude Battery (ASVAB) and (2) develop and validate new predictor and criterion measures representing the domain Of Potential measures. Building on this foundation, Career Force research is finishing developing the selection/classification system and evaluating its effectiveness, with emphasis on assessing second-tour performance. This fourth year of the project completed analyses of test results from the Longitudinal Validation cohort, including the second-tour sample. Development of optimal test batteries predicting first- and second-tour performance, attrition, and reenlistment prospects is continuing.

RN 96-46 The effects of system failure and time limitations on problem Solving behavior and performance, Walker, B. March 1996. (AD A313 208)

To explore the effects of system failure (data error) and time limitations on problem solving and performance, 12 experiments were conducted using two inferential reasoning tasks.

In general, system failure and time limitations lead to significant decrements in performance. In addition, a protocol analysis of problem-solving behavior revealed under both normal and system failure was indicative of a lack of development of metacognitive strategies for working under unreliable conditions. It was recommended that system training under degraded modes of operation should include some provisions for imposing time limits for the completion of certain tasks.

RN 96-47 Modelling terrorist behavior: Developing investigative decision making through the analysis of empirical databases, Wilson, M.; Canter, D.; Smith, A. March 1996. (AD A313 509)

The broad aim of the project has been to understand the nature of behavior during terrorist hostage taking events. This has been approached through the establishment of databases on kidnapping, barricade-siege, and aerial hijacking. Following the creation of the databases, the range and types of actions exhibited have been analyzed through the use of multidimensional scaling techniques. The findings of the project to date indicate very clearly that there is a consistent structure to the way in which terrorist hostage taking events are carried out, with consistent core actions defining the fundamental nature of an approach and a number of subsets of actions indicating differing types of strategy Such information can be very useful to decision makers and negotiators, in addition to the information already available to them, in making the most effective decisions as rapidly as possible.

RN 96-48 Utility analysis models for personnel decision making, Boudreau, J.W.; Dyer, L.D; Rynes, S.L. March 1996. (AD A312 087)

This report summarizes the results of research conducted with support from the US. Army Research Institute for the Behavioral and Social Sciences Office of Basic Research, Contract MDA903-87-K-0001. This research was undertaken to develop and explore the effects of cost-benefit or "utility' models for evaluating the consequences of personal decisions, apply such models to personnel programs, and examine the effects of such models on the decisions and decision processes of personnel managers.

RN 96-49 Leadership and unit effectiveness in combat infantry platoons, Geva, N.; Gal, R. March 1996. (AD A309 601)

Mapping the components of military leadership exhibited by Israeli platoon leaders was achieved using subjective reports by the platoon leaders themselves and by others (peers, subordinates, and supervisors) regarding perceptions of their leadership. The subjective reports (implicit perceptions of leadership) extracted from the analysis of our respondents (91 infantry platoon leaders) suggest the following tentative scheme of leadership: The Israeli platoon leader's representations include both "internal" qualities of the leaders and overt behavioral patterns. The internal qualities are: Two types of military skills (personal and command abilities); two types of motivations (general achievement and military/organizational commitment); and a general factor of traits. The main theme of all the internal elements is a mission-oriented and success-driven individual combatant. The external-overt factor, i.e., behavioral patterns, reveal the classical dimensions of leadership: mission- and task-related

behaviors; the human relations aspects of the group maintenance behavior, and, finally, a value-transmission and educational activity.

RN 96-50 Facilitative effects on performance following modification of circadian rhythms, Badia, P. March 1996. (AD A313 653)

The effects of bright light (BL), Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and caffeine on nighttime melatonin, body temperature, alertness, and performance were studied across 48 hours of sleep deprivation. A total of 180 subjects participated (80 male college students in two primary experiments and 100 subjects in secondary experiments). All secondary experiments are presented in the Appendices. Participants in the primary experiments were assigned to either a dim-light (DL) placebo condition, NSAIDs condition-400 mg of ibuprofen, a 200 mg of caffeine condition (twice during the nighttime), a BL condition, or a combined bright and caffeine condition. BL was 2,000 lux or greater; DL was 100 lux or less. The BL condition and the caffeine condition had immediate effect on nighttime melatonin and temperature levels. These latter two conditions decreased melatonin levels and sharply attenuated the normal nocturnal decrease in temperature. However, the combined treatment of BL and caffeine produced the greatest decrease in melatonin and the highest levels of temperature. NSAIDs decreased melatonin relative to placebo, but showed little effect on temperature. Both conditions of BL and caffeine enhanced performance during the nighttime hours. BL tended to enhance performance for tasks without a memory component but had no significant effect on alertness. In contrast, caffeine enhanced alertness and performance for tasks with or without strong memory components. But the combined treatment of BL and caffeine was the most powerful for enhancing all measures.

RN 96-51 Natural Language access to intelligent systems, Miller, G.A. March 1996. (AD A313 023)

Work under this contract had two components; both aimed at facilitating natural language access to intelligent systems. One aspect was concerned with increasing the vocabularies of personnel who use intelligent systems, and the other was an attempt to increase the vocabulary that systems can process intelligently.

RN 96-52 Canceled.

RN 96-53 Decision support for battlefield planning, Lehner, P.E.; Tolcott, M.A. March 1996. (AD A313 366)

As part of a research program investigating decision support capabilities for battle-field planning, an examination was made of developmental systems in each of five Principal elements of Army C21: maneuver control, fire support, air defense, intelligence and electronic warfare, and combat support services. The systems described generally fall into two categories (with some overlap): (1) decision support systems that attempt to capture automatic specific decision processes, usually employing advanced technologies such as artificial intelligence; and (2) decision aids that attempt to enhance human cognition in command decision making, usually based on psychological research findings. These efforts appear to be mainly driven by

technology, rather than being based on systematic study of operational requirements, and there is little evidence of their operational use. Another type of support, not reviewed, takes the form of application programs that process data already available in management information systems; these are being built into C21 systems by the systems developers, and are therefore likely to find operational use. Increased emphasis on studying command decision malting requirements is recommended.

RN 96-54 Canceled.

RN 96-55 Problem solving and learning in a natural task domain, Kolodner, J; Barsalou, L. March 1996. (AD A312 239)

This report explains the details of some of the problem solving and learning processes employed by novice problem solvers as they become more expert. In particular, the researchers investigate the effects of individual problem solving and learning experiences on later problem solving in the context of troubleshooting.

RN 96-56 Selection and effects of channels in distributed communication and decision-making tasks, Reder, S.; Schwab, R.G. March 1996. (AD A312 093)

This report provides detail descriptions of the results and findings of the 3-year project. Focusing on workgroup tasks and communicative interactions; the methodology developed in this study portrays the fine-grained, dynamic structure of the workday of members of workgroups. Major tradeoffs were found between the resources individuals need to complete their solitary work and those required to support effective communication and cooperation among workgroup members.

RN 96-57 Managerial and organizational determinants of efficiency in research teams (social sciences), Levy-Leboyer, C. March 1996. (AD A313 292)

This research explores the generalizability of the conclusions reached in a previous survey on biomedical research. Various possibilities for a success index in social sciences are discussed. The diversity of the heuristic processes in the social sciences described as well as the variety of leadership styles.

RN 96-58 The subgoal structure as a cognitive control mechanism in a human-computer interaction framework, Jong, H. March 1996. (AD A312 094)

Human-Computer interaction (HCI) research has gained prominence due to the need to make computers easier to learn and use. This research (1) develops an HCI framework to structure and review HCI models, (2) develops a subgoal theory that investigates some pieces missing from current models, and (3) tests the subgoal theory.

RN 96-59 The effects of Performance, individual differences, and arousal on feedback-seeking behavior in a novel computer based task, Rensvold, R.B. April 1996. (AD A313 216)

This report focuses on how situational characteristics affect feedback seeking. It also examines how individual differences in feedback propensities affect feedback seeking. Proposed antecedents of feedback eliciting (overt feedback seeking) were examined utilizing a computer-based technique that permitted objective measurement of the behavior. A 2 X 2 research design was used, with two levels of social presence (an observer present or absent) and two different task rationales (evaluating the task, evaluating the participant). Feedback eliciting was operationalized in two complementary ways -- as the number of times the participant elicited feedback, and as the number of seconds he or she spent examining feedback information. Two types of feedback were examined: (1) outcome feedback, or information about level of Performance, and (2) process feedback, or information about how to improve performance. Separate hypotheses were formulated for each in addition, to social presence and task rationale, the following variables were hypothesized to affect feed-back eliciting: performance, arousal (measured as state anxiety), external feedback propensity, task-specific internal feedback ability, task familiarity, internal feedback propensity, self-esteem, locus of control, tolerance for ambiguity, and need for achievement.

RN 96-60 Reasoning-congruent learning environments Scaffolding learning by doing in new domains, Merrill, D.C.; Reiser, B. April 1996. (AD A313 024)

One major focus of research in cognitive science and education has been the mental representation of problem solving knowledge. Novices facing problems in new domains need to reason about the causes and effects of domain operators to be able to learn from problem solving in the new domain. We argue that this causal reasoning allows novices to apply their learning to new situations. We will first highlight some difficulties facing novices in new domains, and propose a theory of learning environment design emphasizes the role of the problem solving environment as a structured note pad to support incremental planning and execution of problem solutions. We will describe three groups of actions that such an environment must lead students to perform and the outcomes of these actions for novices.

RN 96-61 Novice strategies for comprehending technical texts, Dee-Lucas, D.; Larkin, J.H. April 1996. (AD A313 179)

This project investigated the comprehension of technical texts by novice readers (i.e., people who are not familiar with technical subject matter). It focused on two questions: (1) how do novice readers determine what is important in technical texts, and (2) how does the organization of information in technical domains influence novice text processing and learning. Our research on novice strategies for assessing importance found that novices develop rules defining what categories of information (i.e., definitions, facts, equations, etc.) are important in technical domains, and judge importance in technical texts using these rules. These rules determine what novices attend to during reading, what they remember later, and their depth of understanding of the text. However, these rules are too general to allow novices to accurately assess importance in these texts. Consequently, novices miss some important content and devote effort to learning some of the less important information in these texts. Accordingly, these findings have practical implications for how technical texts should be written to correct for these importance rules and guide novices' attention to the appropriate text content. Our

research on the organization of information in technical domains showed that the order of mention of information in a text, it is more thoroughly processed and more likely to be recalled. This is because (1) readers expect important content to be presented first, and (2) there is greater uncertainty about the role of that information in the context of the passage as a whole Results have implications for how technical content should be organized for novice readers.

RN 96-62 Successful decision making in organizations, Hickson, D.; Miller, S.; Wilson, D. August 1996. (AD A313 540)

Business and other organizations in Britain were revisited to study the outcomes of implementing 55 strategic (major) decisions. These were a subsample of 150 cases studied previously when the decisions were made. Chief executives and directors (that is, presidents and vice presidents and equivalent) were interviewed about what happened. A series of factors that appear to contribute to success and failure is being elucidated. These reasons for good or bad performance can better inform senior managements in the future and be an aid to more successful decision making.

RN 96-63 1996 Army symposium: "Leadership challenges of the 21st century" executive summary, Hunt, J. G.; Phillips, R L. August 1996. (AD A312 092)

The 1996 Army Leadership Symposium: "Leadership Challenges of the 21st Century Army" was held at Cantigny Estate, Wheaton, Illinois from 27-29 March 1996. The symposium brought together senior Army leaders and noted academics to discuss the key leadership and leader development issues facing the Army as it moves into the 21st century. This report summarizes the event and documents the key issues identified during the discussions. These issues primarily concern defining the operational environment of the future, the implications for leadership and leader development as a result of the changing technology and missions, and the implications for leadership and leader development research to ensure a strong theoretical and research base for the Army's leader development plans and Programs. Discussions also emphasized the need to maximize human potential and maximize the benefits from leader development resources.

RN 96-64 Methods for analyzing group problem solving decision making, Fischer, U. August 1996. (AD A312 002)

This paper describes two methods for analyzing cockpit discourses. One coding scheme was developed to characterize the functions of crew discourse within a problem solving and decision making context. A second method is concerned with the conversational coherence of crew discourse. Both methods complement each other in describing how crews establish through language-shared mental models for the situation.

RN 96-65 Senior leadership: Annotated bibliography of research supported by the Army Research Institute, Zaccaro, S. J August 1996. (AD A312 006)

This report presents an annotated bibliography of research on senior leadership sponsored by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI)

primarily between 1985 and 1994. This research has covered themes related to the nature of work and performance requirements at the executive level; the knowledge, skills, abilities, and other characteristics needed to meet these requirements; the measurement of key senior leadership constructs; and the formulation of development and training technologies for the inculcation of requisite leadership qualities. An examination of the parameters of this research indicates that (1) as a whole, this research has proceeded from a single coherent theoretical framework; (2) more than one half of the products in this research base (63%) can be characterized as nonempirical; (3) one half of the empirical studies (50%) utilized primarily a qualitatively or descriptive research methodology; and (4) the nature of senior leadership work and requisite KSAOs has received more attention (53% and 58%, respectively, of the entries) than measurement (23%) or specific development and training strategies (44%). The annotated bibliography presented here serves as the initial step in a critical analysis and review of the research on senior leadership generated by ARI.

RN 96-66 Cognitive tutors: Lessons learned, Anderson, J. P.; Corbett, A.; Keodinger, K.; Pelletier, R. August 1996. (AD A312 246)

This paper reviews the 10-year history of tutor development based on the ACT theory (Anderson, 1983,1993). We developed production system models in ACT of how students solved problems in LISP, geometry, and algebra. Computer tutors were developed around these cognitive models. Construction of these tutors was guided by a set of eight principles loosely based on the ACT theory. Early evaluations of these tutors usually but not always showed significant achievement gains. Best-case evaluations showed that students could achieve at least the same level of proficiency as conventional instruction in one-third the time. Empirical studies showed that students were learning skills in production-rule units and that the best tutorial interaction style was one in which the tutor provides immediate feedback, consisting of short and directed error messages. The tutors appear to work better if they present themselves to students as non-human tools to assist learning rather than as emulations of human tutors. Students working with these tutors display transfer to other environments to the degree that they can map the tutor environment into the test environment. These experiences have coalesced into a new system for developing and deploying tutors. This system involves first selecting a Problem-solving interface, then constructing a curriculum under the guidance of a domain expert, then designing a cognitive model for solving problems in that environment, then building instruction around the Productions in that model, and finally deploying the tutor in the classroom. New tutors are being built in this system to achieve the NCTM standards for high school mathematics in an urban setting.

RN 96-67 Job aid for automated battalion tactical operations center: Combat vehicle command and control system (CVSS.) application, Sever, R. S.; Smith, P G.; Heiden, C. K.; Quinkert, K A. August 1996. (AD A313 363)

The U.S. army's reliance on advanced information systems underscores their anticipated impact of battlefield information centers, such as Command and Tactical Operations Centers (TOCs). This job aid was developed for staff members in an automated battalion TOC, as Part of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) efforts to explore the impact of advanced information systems on armor

operations. Although conventional staff assignments were maintained, the introduction of automated TOC workstations significantly impacted how information gathering, processing, and distributing functions were performed. This aid provided the TOCs staff members with directions on when and how to perform essential staff actions during real-time battalion level operations. This job aid highlights the need for related training initiatives and may guide developers in their efforts to provide the training support needed as the Army develops advanced information systems.

RN 96-68 Applicability of the **Department of labor's O*NET for Army Occupational Analysis,** Russell, T L.; Mumford, M. D.; Peterson, N. G. August 1996. (AD A313 336)

The Content Model of O*NET, Department of Labors forthcoming computerized successor to The Dictionary of Occupational Titles, is described as an expanded, more powerful conceptual basis for occupational analysis in the Army. Its potential applications to the traditional and emerging needs of the Army's manpower, personnel, and training systems are illustrated. A possible Army adaptation of O*NET, with application windows for recruiting, course development/evaluation, selection and assignment, and mission staffing is sketched.

RN 96-69 Military enlistment propensity: A review of the literature, Lawrence, G. H.; Legree, P. August 1996. (AD A319 605)

This paper reviews and comments on recent reviews of enlistment and enlistment propensity. Interpretations of recruit motivation categories are offered, and implications for marketing and recruiting are discussed. Areas for new research are suggested. An appendix provides abstracts for relevant selected publications 1991-early 1994.

RN 96-70 An empirical assessment of coaching and practice effects on three Army tests of spatial aptitude, Busciglio, H. H.; Palmer, D. R. August 1996. (AD A319 506)

Three Army tests of spatial aptitude--Assembling Objects, Figural Reasoning, and Orientation--were included in the Enhanced Computer Administered Testing (ECAT) project. ECAT was a joint service effort to evaluate measures for possible addition to future versions of the Armed Services Vocational Aptitude Battery (ASVAB). Because both practice and coaching effects might threaten the long-term validity of these tests, US. Amy Research Institute for the Behavioral and Social Sciences researchers assessed their susceptibility to such effects. Overall, we found coaching and practice effects that are comparable to those obtained in previous research using spatial tests. The Orientation test was the only measure for which specific coaching led to significantly larger effect sizes than did practice alone. These results have ramifications for future research and development, such as exploring ways to: (1) lower the susceptibility of the Orientation test to coaching, and (2) reduce practice effects on the Assembling Objects and Figural Reasoning test. We hope these activities help to ensure the long-term validity of these Army tests.

RN 96-71 Canceled.

RN 96-72 The Army Research Institutes Enterprise Information Systems Architecture and Strategic Plan Support, Stickles, A.; LeJeune, D.; Maple, S. August 1996 (AD A322 552)

This report documents the current automated capabilities of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). It describes the hardware, software, and communications infrastructure currently m place to support the ARI community at ARI Headquarters in Alexandria, VA.

96-73 Building and retaining the career force: New procedures for accessing and assigning Army enlisted personnel--final report, Campbell, J.P; Zook, L.M. August 1996 (AD A320 954)

The career force research project is the second phase of a two-phase Army program to develop a selection and classification system for enlisted personnel, based of expected future performance. In the first phase, Project A, a large and versatile database was collected from a representative sample of Military Occupational Specialties (MOS) and used to (a) validate the Armed Services Vocational Aptitude Battery (ASVAB) and (b) develop and validate new predictor and criterion measures representing the entire domain of potential measures. Building on this foundation, career force research has finished developing the selection/classification system and evaluating its effectiveness with emphasis on assessing second-tour performance. The final year of the project was devoted to developing optimal test batteries for predicting first- and second-tour performance, attrition, and reenlistment prospects, and estimating gains that might be expected from their use. The present report summarizes the entire Project A/Career Force research program.

RN 96-74 Scoping instruction at the combined arms and services staff school, Lussier, J. W.; Frame, A. A. September 1996. (AD A319 507)

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), Fort Leavenworth Research Unit, regularly conducts research and evaluation in support of the Command and General Staff College. ARI provided the Combined Arms Services Staff School (CAS3) with program development by providing curriculum evaluation for the Scoping Program of Instruction (POI). The Scoping POI deals specifically with students' ability to identify major factors of a problem, make reasonable rapid rough estimates of the effects of the factors, purposely neglect small or significant factors, and develop a quick overall gross level "picture" of the problem. Examination of this curriculum for CAS3 and enlisted populations show enhanced scoping performance following instruction.

RN 96-75 User evaluation of the utility of twelve decision aids, Trent, A. P.; Riedel, S. L. September 1996. (AD A320 266)

This paper describes the user evaluation of 12 decision aids used during Prairie Warrior 94, at Ft. Leavenworth, KS. Fourteen students from Command and General Staff Officer College and five data collectors participated in the study. The function of the decision aids varied from visualization of the battlefield to exchange of information to weather analysis.

RN 96-76 Job analysis of special forces jobs, Russell, T L.; Crafts, J. L.; Tagliareni, F A.; McCloy, R. A.; Barkley, R. September 1996. (AD A324 584)

This report describes a job analysis of U.S. Army Special Forces (SF) jobs. The primary products of this project were behavior-based rating scales for SF jobs, definitions of individual attributes important for successful performance in SF jobs, and job task ratings. These products form the foundation for development and validation of selection and classification measures for SF jobs.

RN 97-01 VIEW: Visualization and Interactive Elicitation Workstation-A Tool for Representing the Commander's Mental Model of the Battlefield, Zacharias, G.; Ilgen, C.; Asdigha, M.A., Yara, J. December 1996. (AD A322 458)

This research assessed development of a Visualization and Interactive Elicitation Workstation (VIEW) for inferring and representing mental models of the battlefield. The prototype is composed of two subsystems: a Visualization subsystem and a Knowledge Elicitation (KE) subsystem. The Visualization subsystem is composed of three interlinked modules: (1) a Tactical Visualization Interface providing liked displays for visualizing the battlefield; (2) an Object Database providing a common object representation for environmental and military entities; and (3) an Object World Model providing behaviors for objects in the database. The KE subsystem is composed of two linked modules: (1) the KE interface, which navigates across direct, indirect, and observational techniques, collection of elicited data, and KE analysis results; and (2) the KE Recording/Analysis Module, which records the elicited data. A demonstration illustrates coupling between the visualization and elicitation components and support of direct and indirect mental model examination. Direct techniques use a case-based interview format; indirect techniques include repertory grid analysis, multidimensional scaling, and hierarchical cluster analysis.

RN 97-02 Canceled.

RN 97-03 A Note on Organizational Leadership as Problem Solving, Tremble, T.R. Jr.; Kane, T.; Stewart, S.R. January 1997. (AD A328 330)

Approximately 780 officers in the chains of command of 53 U.S. Army battalions responded to paper-and-pencil exercises in order to test the replicability of earlier results on a model which links effective leadership to problem-solving abilities. In this replication, criteria included subordinate and superior assessments of leadership behavior/performance as well as career achievement (rank and awards). Limited replication of the earlier results was obtained. The group of variables reported earlier to predict achievement were also significantly associated with achievement in this replication. However, strengths of relationship were appreciably less than reported earlier for achievement and weak (even though statistically significant) for superior and subordinate assessments. The obtained data also raised questions about the validity of measures newly designed for the earlier effort and about the reliability of measurement needed for leader development research and practice.

RN 97-04 Appendices. Service Tactical Training with Distributed Interactive Simulation Technology, Bell, H.H.; Dwyer, D.J.; Meliza, L.L.; Love, J.F; Mirabella, A.; Moses, F.L. February 1997. (AD A336 275)

These appendices support a report, bound separately, which recommends practices for planning and conducting tactical training using Distributed Interactive Simulation (DIS) technology with multi-Service groups. Groups are geographically separated. The recommendations presented are based on the experience gained from the Multi-Service Distributed Training Testbed (MDT2) -- a testbed designed to develop training opportunities and tools to increase the utility of multi-Service training. MDT2 is a realistic, although synthetic, environment for training with the flexibility to support planning, preparation, execution, and feedback for the multi-Service Close Air Support (CAS) mission. This report combines the knowledge from MDT2-CAS with the authors' knowledge of training into recommendations about how to train best with DIS technology.

RN 97-05 The Utility of the Training and Evaluation Outline Data Base as a Performance Measurement System at the Joint Readiness Training Center, Fober, G.W. March 1997. (AD A328 136)

The purpose of this research was to examine the Training and Evaluation Outline (T&EO) database for utility as a performance measurement system. Previous research had determined that the database was of limited value for making empirical analyses of the Joint Readiness Training Center (JRTC) performance data. Based on recommendations from the previous findings, JRTC changed the performance measurement system. The changes included the introduction of a five-point rating scale and a reduction in the number of rated items. The current research was conducted to determine whether these additions increased the utility of the T&EO database as a feedback and performance measurement system. T&EO data were analyzed at battalion task force, company, and platoon levels for nine rotations at the JRTC. It was found that the T&EO data base still lacks the reliability required to provide useful feedback to units or to provide researchers with useful information on unit trends. Although tasks differed statistically, the usefulness from a practical standpoint is limited because the range of scores is too narrow. Potential users of the database are cautioned not to make conclusions based solely on statistical significance. Recommendations to improve the data include reducing the rating categories to more general levels and placing a greater emphasis on the importance of a quality performance measurement system. A method to reduce the number of rating categories using subject mater experts was introduced as one way to improve the performance measurement system.

RN 97-06 Environment for Multi-Media Interactive Instruction (EMMii) Users Manual, Andre, C.R.; Salter, M.S. March 1997. (AD A328 141)

This report documents the Environment for Multi-Media Interactive Instruction (EMMii), the training management system used in the Battalion and Brigade Battle Staff Training System (BSTS). BSTS, a set of functional area training packages for battalion- and brigade-level staff officers, is a combination of text and computer-based instruction (CBI). Sponsored by the Advanced Research Projects Agency (ARPA), the BSTS was developed for

use by the U.S. Army National Guard (ARNG). These prototype BSTS comprised 13 courses for training staff officers in individual functional areas and those tasks required to prepare staffs for collective battle staff tasks. This report is for archival purposes only; the EMMii is not available as a stand-alone product.

RN 97-07 Education Credential Tier Evaluation, Laurence, J.H.; Ramsberger, P.F.; Arabian, J.M. May 1997. (AD A335 804)

This report summarizes the education credential tier system used to reduce the likelihood of first-term attrition among enlisted personnel. In addition, the reliability of coding credentials within their assigned tiers as well as the appropriateness of credential categorization is assessed. Finally, multivariate analyses of sociodemographic characteristics related to attrition are presented to demonstrate the confluence of personal factors associated with attrition.

RN 97-08 Visualization and Judgmental Forecasting of Simulated Battles, Solick, R.E.; Spiegel, D.K.; Lussier, J.W.; Keene, S.D. May 1997. (AD A328 489)

Army officers were given information about battles fought in training exercises. They were required to report upon the current situation and to predict future locations and strengths of the forces involved. A battery of cognitive tests was also administered. Accuracy of judgment was associated with experience and with some of the cognitive abilities tested, particularly with memory for spatial relationships, at which the officers excelled. However, the influence of experience was dependent upon the inherent predictability of the scenario. Experienced officers did better on a normal mission plan but were less accurate on a plan that was poorly executed. The overall pattern of results suggested that accuracy is strongly influenced by the pace of battle. Static or slowly changing conditions were relatively easy to visualize and predict, but rapidly changing conditions were associated with large increases in error.

RN 97-09 Evaluating the Effectiveness of CAS3 from the Perspectives of the Students, Fuegen, K.A.. May 1997. (AD A328 508)

The Combined Arms and Services Staff School (CAS3) is a 6-week course for Army Captains that teaches the skills necessary to function as effective staff officers. The U.S. Army Research Institute for the Behavioral and Social Sciences helped in the evaluation of CAS3 by collecting feedback from students regarding their experiences in the course. One week before graduation, CAS3 students completed a survey that assessed improvement on a variety of skills and asked for the students' perceptions of the course. This report is based on the students' most and least valuable experiences at CAS3 as well as their recommendations for change. Although interacting with other branches was viewed as one of the most valuable experiences at CAS3, students listed poor group dynamics as one of their least valued experiences at CAS3. The results are discussed in terms of recent changes at CAS3 and the importance of the combined arms concept.

RN 97-10 Formatting Battlefield Function. Function Analysis for Automated Systems Approach to Training, McIlroy, B.J.; Mullen, WJ. III. March 1997. (AD A336 090)

The Armored Forces Research Unit, U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), in coordination with the U.S. Army Force XXI Training Program (FXXITP), has sponsored research on the utility of battlefield functions (BFs) for training the armored brigade. This research is a continuation of previous work performed to analyze and use BFs applicable to the heavy battalion task force to support a Functional Approach to Training strategy. This report provides the history and lessons learned for the effort to analyze seven BFs applicable to the armored brigade, as well as describes the methodology and procedures used to develop function analyses (FAs) for the selected brigade BFs. The methodology and processes used for the development of BF FAs are described and provide the basis for future development of BF FAs for other type units and echelons.

RN 97-11 Feedback for Skill Acquisition: Preliminaries to a Theory of Feedback, Schmidt, R.A. May 1997. (AD A328 695)

In training for skills, feedback about skill proficiency-termed knowledge of results (KR) in the laboratory-is critical to efficient learning. But, while various manipulations of KR in acquisitions can provide immediate benefits for performance, these may disappear in retention tests. In several paradigms, we show that (compared to feedback after each trial) making feedback less "useful" by giving it less frequently, or by summarizing or averaging it after several trials, degrades performance in acquisition, but produces superior learning as measured on retention or transfer tests. Preliminaries to a guidance theory are proposed on retention or transfer tests and are proposed to account for these effects. In this view, frequent feedback has various negative effects that degrade retention, such as (a) the encouragement of maladaptive short-term corrections that disrupt response stability, and (b) the blockage of information-processing activities that lead to the learning of error-detection capabilities. Practical implications of these concepts for Army training procedures are discussed.

RN 97-12 Team Training and Performance Research: A Ten-Year Review, Browers, C.A.; Weaver, J. L.; Urban, J.M.; Morgan, B.B. Jr. May 1997. (AD A335 775)

The military has become dependent upon the performance of teams for many critical tasks. Consequently, there is a clear need to understand the nature of team performance to develop training interventions for use in ensuring effective military teams. Unfortunately, the scientific literature regarding team performance has provided little guidance regarding the nature of team performance or the most efficacious paradigms for team training. Since Dyer's review (1984) 10 years ago, interest in team training and performance has greatly increased. The cur-rent effort discusses issues raised by Dyer in light of the past 10 years of research and remaining research needs in these critical areas.

RN 97-13 The Development of Patterns of Commitment: Implications for Performance, Becker T.E.; Billings, R.S. May 1997. (AD A328 692)

This report provides the results of four studies of the relationship among certain dispositional variables, cognitive factors, employee commitment, intentions, and performance. Study I developed measures of attachment styles, Study 2 examined the relationships between personality factors (including attachment styles) and job attitudes, Study 3 demonstrated that attachment styles and motivation to commit predict organizational commitment, and Study 4 established that certain forms of commitment predict employee performance. Conclusions and recommendations are presented for each study.

RN 97-14 Skilled Use of Computer Software: Implications for Training and Design, Olson, J.; Polson, P June 1997. (AD A328 492)

This research had two goals: to work toward developing a comprehensive cognitive theory of human-computer interaction, both learning and performance, and to develop methods for designers to apply this knowledge to the design of new software and its training. The researchers compare the actual moment-by-moment activity of users of software with predictions from a model, leading to extensions of the model and additional rounds of empirical testing. At the end of the project, more was understood about the development of expertise in people who use software, focusing in particular on how people build on what they know already when they encounter a new application. In the second methodology, designers follow concrete, well specified steps that guide them through a set of analyses-first of the users' tasks, and then highlighting aspects of the target system that the model tells us may prove difficult for the user to learn or perform. The researchers conclude with an attempt to develop methods for designers to help them assess how long it will take to learn the software, based both on the complexity of the software and how much the learner already knows.

RN 97-15 The Analysis of Equivalence Classes, Fields, L. June 1997, (AD A336 076)

Many essential skills required of military personnel involve responding in the same manner to cues that are perceptually different. One example of such a set of cues would be the representations of an airplane produced by visual sighting, radar, infrared detection, and IFF, or acoustic signature. Another example would be the topographical map representation, the visual image, and the orienteering symbol for a given terrain feature, such as a mountain. Perceptually different cues that have become interchangeable are said to form an equivalence class. Recognizing the interchangeability of the representations in the airplane set is critical if one is to react appropriately to an airplane in battlefield conditions; recognizing the interchangeability of the representations in the terrain set is critical if one is to navigate appropriately from a map. In addition, because the cues experienced in training will resemble but will not be identical to the cues encountered in the field, it is also critical for individuals to generalize from the cues in training to the cues in the field.

RN 97-16 Enhanced Virtual Presence for Immersive Visualization of Complex Situations for Mission Rehearsal, Cutt, P. June 1997. (AD A336 568)

This final report describes the key requirements of an Internet-based system that provides an immersive environment for mission rehearsal. It shows how off-the-shelf hardware and software can be used to meet those requirements. A layering implementation technique is

used with the common hardware and software to provide economies of scale both in the use of new hardware/software and functionality. Finally, specific hardware/software is described where necessary to provide support for mission rehearsal. In particular, new inventions such as the Internet Appliance and Remote Access Controller are described in detail together with their implementation.

RN 97-17 Rapid Capturing of Battlefield Mental Models, Cohen, M.S.; Thompson, L.A.; Bresnick, T.A.: Tolcott, M.A.; Freeman, J.T. July 1997. (AD A336 079)

The present report pursues theoretical, empirical, and practical issues in the design of a real-time mental model capturing system. We describe a framework for situation understanding that includes several qualitatively different types of mental models (pattern-matching, interpretative, and generative), and a set of metacognitive processes that monitor mental models for problems of uncertainty and adopt corrective strategies when problems are found. Based on coding and analysis of interview and problem-solving data, a set of five key mental model structures was identified that officers consistently use to organize their understanding of battlefield situations. Based on further analysis of the same data, we found features of the environment, the context, and the individual officer that predict the type of mental model that is used. Finally, we drew on these results to develop a proof-of-concept mental model capturing system. The system provides users with flexible tools for creating graphical structures to represent both their knowledge and uncertainty regarding a situation. The system dynamically adjusts its advice based on the environment, user, and immediate context. This system has potential use as a decision support tool, as a team aid, in evaluation and training, and as a research tool.

RN 97-1 8 Optimizing the Long-Term Retention of Skills: Structural and Analytic Approaches to Skill Maintenance, Healy, A.F August 1997. (AD A336 077)

Progress has been made on the topics of tank gunner skills, Morse code reception, color naming, instrument panel scanning, tests of the procedural reinstatement framework, mental calculation, memory for instances of categories, target detection, data entry, aspects of memory for lists, aspects of memory for course schedules, and vocabulary retention.

RN 97-19 Leadership Experience and Organizational Performance, Fiedler, F.E. August 1997. (AD A335 798)

This report summarizes the major findings of a 20-year program of research on the role of cognitive resources in organizational performance. By cognitive resources we mean principally intellectual abilities, job-relevant technical knowledge, and experience. This particular report focuses primarily on the role and function of leadership experience.

RN 97-20 A Cognitive Architecture for Solving III-Structured Problems: Final Report, Holyoak, K.J.; Thagard, P August 1997. (AD A336 505)

A computational theory of analogical mapping is described, based on a set of constraints. The theory is embodied in a computer simulation that is applied to several examples, including psychological data on the mapping process.

RN 97-21 Problem Solving of Mid-Career Army Officers: Identification of General and Specific Strategies, Pounds, J.; Fallesen, J.J, August 1997. (AD A335 891)

The Army needs a better understanding of how skilled military leaders solve problems in complex battlefield situations. The military has relied on analytic comparison methods and "6-step" models. Recent studies found that these methods do not correspond to complexities of actual tactical situations. Shortcomings of rigid procedures highlight the usefulness of more naturalistic approaches but research has yet to provide detail about using naturalistic strategies. Eighty U.S. Army officers were interviewed and asked to recommend courses of action for tactical scenarios. They discussed their approaches to problems and identified strategies used in their thinking. Results showed that participants used combinations of approaches within problems. Differences in how strategies were used to develop courses of action were compared. One set of strategies was identified as positive or negative indicators for four likely solutions. Results suggest that to effectively train skilled problem solving, approaches and strategies that are actually being used first have to be identified, their advantages and disadvantages characterized, and methods for training them developed. Findings can be used to support training by identifying how thinking leads to solutions and how more and less skilled problem solvers differ in the ways they solve problems.

RN 97-22 Current State of Army Aviator Selection, Cross, K. D. August 1997. (AD A337 686)

The current version of the Army's Flight Aptitude Selection Test (FAST) is aging and its predictive validity has declined substantially since it was first implemented. An analysis of existing records was performed to (a) determine the impact of the FAST's declining predictive validity on aviator trainee eliminations and setbacks, and (b) estimate the benefits of increasing the FAST cut-score from its present value of 90. The analysis focused on the eliminations and setbacks that occurred during the period between January 1, 1989, and December 31, 1995. Detailed data are presented on (a) the annual number and costs of eliminations and setbacks, (b) the causes of eliminations and setbacks, and (c) the estimated consequences of increasing the FAST cutscore.

RN 97-23 The Psychology of Work in Europe: A Review of a Profession, de Wolff, C.J.; Shimmin, S. August 1997. (AD A336 073)

This review describes the contemporary scene of applied industrial and organizational psychology in Europe. After a historical introduction, the developments in six subject areas are reviewed: Selection, training, ergonomics, organizational psychology, quality of working -life, and preservation of human resources. It is argued that there has been much differentiation and that there is a need for more integration. Psychologists perform several roles in organizations and in society. Some of the role conflicts are discussed.

RN 97-24 Coordinating Information and Decisions of Hierarchical Distributed Decision Units in Crises, Rose, G.L. August 1997. (AD A336 263)

A program of research is described. The research addressed decision making by distributed decision makers using either consensus or leader structures and confronted by both routine tasks and different kinds of information system crisis. There were three phases--a macro combining published empirical research, a simulation, and experimentation. The first phase documented that experimental research can offer very limited guidance for administrators as it only rarely investigates groups, and never organizations, in crises. The second phase exposed the challenges of combining simulations of individual (e.g., cognitive), group, organizational, environmental, and task properties as a strategy for guiding future experimental research. The third phase extended the capabilities of an organizational simulator and used it as a testbed for experiments. The simulator uses networked personal computers for all communications and records all communications and transactions between team members. Despite training in the simulator prior to experiments, participants failed to effectively exploit potential crisis response capabilities. Results suggest the importance of expanding systemic perspectives and practice with short-term redesign of available systems for people who work in distributed decision environments subject to crises. Experience with the simulator also suggested guidelines for future experiments on pseudo-organizations.

RN 97-25 Examining the Effect of Communication Training and Team Composition on the Decision Making of Patriot Air Defense Teams, Adelman, L.; Christian, M.; Gaultieri, J.; Bresnick, T. August 1997. (AD A336 267)

An experiment investigating the effect of communication training and four group composition variables was performed with Patriot air defense teams for two different types of aircraft identification tasks. It was predicted that communication training would significantly enhance communication quantity and quality and, in turn, team performance for both tasks. Although the training did sometimes improve team communications processes, it did not improve team performance. The variable that had the biggest positive effect on communication quality and team performance was the number of hours a team had worked together. This effect was only found, however, for the type of task for which Patriot teams routinely train. It did not transfer to the less frequent and more cognitively stressing task where there is conflicting information about unknown aircraft, as in the U.S.S. Vincennes tragedy.

RN 97-26 Causal Models in the Acquisition and instruction of Programming Skills, Reiser, B.J. August 1997. (AD A336 591)

This research project investigated how an interactive learning environment can support students' learning and acquisition of mental models when acquiring a target cognitive skill. In this project, we have constructed GIL, an intelligent tutoring system for LISP programming, and have used GIL to conduct pedagogical experiments on skill acquisition. We have studied two ways in which an interactive learning environment can facilitate students' acquisition of novel complex domains. The first set of studies examines how graphical representations provide a representation more congruent with students' reasoning. A second set of studies examines how explanatory feedback, generated from the system's problem solving knowledge,

can facilitate students' learning. The experiments demonstrate computer-based support during learning can help students construct a more effective model for reasoning in complex domains.

RN 97-27 Canceled.

RN 97-28 Examining the Effects of Cognitive Consistency Between Training and Displays, Adelman, L.; Christian, M.; Johnson, K. August 1997. (AD A336 087)

This paper describes the third and final experiment performed on Contract MDA903-92-K-0134. This experiment tested the "display cognitive consistency hypothesis" proposed in Adelman, Bresnick, Black, Marvin, and Sak (in press). This hypothesis states that the effectiveness of a display format for decision aiding systems, like Patriot, depends on the consistency between how the system displays its reasoning process and how the person is processing the information. Results of an experiment using simulated Army air defense task and college students found support for the hypothesis, but only at a situation-specific, not global, level. Although unexpected, these results were consistent with other research performed on this contract, indicating the importance of situation-specific context for understanding judgment and decision processes in individual and group settings.

RN 97-29 Acquisition and Transfer of High-Workload Skill, Lundy D.H.; Schneider, W. August 1997. (AD A335 860)

Simultaneously practicing multiple tasks results in high-workload skills that may not be acquired by practicing the same tasks as single tasks. In three experiments, subjects watched a rapidly changing display and responded to consistently mapped targets in four tasks. Some subjects practiced one task at a time; some subjects practiced two tasks at a time as dual tasks; some subjects practiced combinations of single and dual tasks. After acquisition, all subjects performed transfer tasks that were multiple tasks not performed together during acquisition. The results showed a large decrease in performance when subjects were introduced to multiple tasks after training single tasks. Dual-task training resulted in nearly perfect transfer to novel task combinations. These results are discussed in terms of the practical implications of multiple-task compensatory activities.

RN 97-30 Research on Interorganizational Decision Making Within a British Airport, Heller, F.A.; Solomon, E. August 1997. (AD A337 477)

The research investigated the complex process of decision making over time, its effectiveness, and achievement. Participation by lower employees and high status of consultative committees are characteristics of democratic effective decision making. Other major influences are Meta Power (external influences) and turbulence (uncertainty). A key finding is the existence of four fairly recognizable phases of the decision cycle. The variables under investigation in the decision-making cycle show significantly different impact in the four phases.

RN 97-31 Individual Feedback Propensities and Their Effects on Motivation, Training Success, and Performance, Herold, D.M.; Parsons, C.K.; Fedor, D.B. September 1997. (AD A337 479)

This research project had as its goal the development, validation, and field testing of new measures of individual differences that assess people's propensities to seek, generate, or interpret performance feedback information in a particular way. Specifically, based on preliminary work, it was thought that internal and external propensities exist that make individuals more or less likely to prefer, rely on, seek, or attend to primarily internally or externally generated performance cues. These propensities, if identified and measured, would be related to skill acquisition, performance improvement, self-regulatory processes, performance maintenance, as well as a variety of affective and cognitive responses to performance settings based on the interaction of the performer's feedback predispositions and the characteristics of the feedback available. In summary, this study proposed to help one better understand the role of dispositions in explaining how different individuals go about shaping their feedback environment, processing feedback information, and responding to such information. The driving belief behind this line of research has been that individuals differ in ways that are specific to their orientation toward performance feedback situations, and that such differences, if identified and appropriately measured, would be valuable in better understanding the links between feedback and performance as well as other outcomes of interest (e.g., feedback-seeking, satisfaction, etc.).

RN 97-32 Analysis of the Organization of Lexical Memory, Miller, G.A. September 1997. (AD A337 809)

The practical outcome of the project, "Analysis of the Organization of Lexical Memory," is an electronic lexical database called WordNet that can be incorporated into computer systems for processing English text. WordNet includes approximately 45,000 lexicalized concepts, providing a coverage equivalent to a handheld dictionary. The database has three components, one each for nouns, verbs, and adjectives. The semantic relations that organize each component are different, but in general a lexicalized concept is represented by a set of synonyms that can be used to express the concept, the familiar semantic relations are represented by labeled pointers between synonyms sets. In order to create the database, programs were written to write and edit lexical files, to convert lexical files into database, to search the database, to strip inflections from search requests, and to display retrieved information for a user. Three user interfaces have been developed for WordNet. (1) The simplest is a commandline version that does not require a windowing system and can run on standard monitors. (2) A browser written for Sun View and for X-11 windows is intended for use with an on-line dictionary; by using WordNet, the dictionary can be searched conceptually as well as alphabetically. (3) A lexical filter written for X-11 windows catches unfamiliar words in a text file and suggests alternative expressions.

RN 97-33 On Verification of Multiplication Facts: An Investigation Using Retrospective Protocols, Romer, S. September 1997. (AD A337 482)

Current theories of mental multiplication elicit two questions: (a) Do the same processes underlie answer production (e.g., 4x7=?) and answer verification (e.g., 4x7=28, T/F), and (b) Does any theory centered around a single strategy suffice to explain the underlying mechanisms for these tasks? This study involved addition of retrospective protocols to a verification task, in two experiments. The patterns of effects for reaction times (RT) and errors in both experiments were similar to Campbell's (1991) findings, suggesting that the addition of the protocols did not significantly alter the task. Analysis of the protocols provided evidence that retrieval of the correct answer from memory and then comparison to the answer given was the modal strategy reported in both experiments but was not reported for 100% of the trials. These findings imply that the same processes that underlie production are involved. Furthermore, the use of protocols can facilitate differentiating what strategies are involved and provide evidence that any theory of this skill assuming one strategy will likely be incomplete.

RN 97-34 Effects of Stress on Judgment and Decision Making, Hammond, K.R.; Doyle, J.K. September 1997. (AD A338 724)

This monograph (Part II) is the second of a planned three-part series. Following Part I, which examines four literatures related to judgment and decision making (J/DM) under stress, Part II narrows its focus to a detailed treatment of stress within the J/DM literature. Six sections are included: (a) an introduction, bridging Parts I and II, (b) a consideration of two principal topics (rationality and performance) in the J/DM literature in relation to stress, (c) an examination of current textbooks, anthologies, and reviews, as well as books and articles in the human factors field, with regard to their treatment of stress and J/DM, (d) a description of current J/DM theories and models and their potential utility for the study of J/DM under stress, (e) an examination of methodological issues bearing on research on J/DM under stress, and (f) the outline of a new approach intended to advance theory and method. The general conclusion drawn from the examination of the aforementioned material (including an additional several hundred articles not cited) is the same as that drawn from the work in Part I, namely, research is lacking in coherent theoretical background, diffuse in content, and completely lacking in secure generalizations. If progress is to be made with regard to this topic, critically important to the military and other sections of society, a resolute, comprehensive effort will have to be made, theoretically, methodologically, and empirically. Part III (forthcoming) will consist of an attempt to meet these goals.

RN 97-35 Immersive Visualization of Complex Situations for Mission Rehearsal, Kasper, P.K. September 1997. (AD A337 487)

The program objectives of this report included identification of an appropriate rehearsal scenario, as well as the requirements and specifications for necessary computer hardware and software. Key considerations in identifying the training scenario were intrinsic benefit to the Army, effectiveness of virtual environments for training, and benefit from implementation over a distributed computer system.

RN 97-36 Training Efficiently in Virtual Environment: Determinants of Distance Perception of Stationary Observers Viewing Stationary Objects, Witmer, B.G.; Kline, P.B. September 1997 (AD A337 488)

The accurate perception and estimation of distance is an important element of many military tasks. It is necessary for orienting oneself on the battlefield, for making optimal use of terrain features during navigation, and for judging the distance from one point to another. It is also a component of both route and configuration knowledge and acquisition. In order to maximize transfer from Virtual Environment (VE) to the real world, it is important to develop an understanding of the capabilities and limitations of this new training medium. Toward that end, the present study sought to gain insight about the conditions affecting distance estimation of VEs. The purpose of this research is to examine factors that influence the perception of distance in VEs. Two experiments were designed to investigate the relative effects of such factors on distance estimates of a stationary observer positioned at near and medium distances from an object. Factors found to improve distance estimates in these experiments will be incorporated into the design of VEs for subsequent investigations.

RN 97-37 Enhancing Effective Decision Making by Information Management Techniques, Breznitz, S.; Ben-Zur, H.; Wardi, N. September 1997. (AD A340 602)

Four experiments varying in complexity of decision tasks were conducted to study the effects of information about expected length of task on decision processes and choices. All experiments utilized a combined between and within subjects design with two initial levels of information (long vs. short expected list of items) and subsequent information change (reducing the long and increasing the short). In two experiments, a computerized process methodology provided detailed data on information search, speed, and strategy used. Individual differences were tested using a battery of personality characteristics. The results indicated that initially encouraging information enhances the quality of decision processes, particularly during the first phase of the task. The impact of information change was less prominent, although it produced full reversals in several indices of decision performance. Personality characteristics interacted with the information manipulations. The role of cognitive resource allocation in decision tasks and several practical implications are discussed.

RN 97-38 Towards the Improvement of Training in Foreign Languages, Healy A.; Barshi, I.; Crutcher, R.; Tao, L.; Rickard, T.; Marmie, W.; Schneider, V ; Feldman, A.; Buck-Gengler, C., Romero, S.; Sherrod, N., Parker, J.; Bourne, L. Jr. September 1997. (AD A337 530)

Progress has been made on the topics of use of first-language strategies in second-language learning, the size and the nature of the functional units of reading, language processes in voice communication, vocabulary acquisition and retention, learning linguistic categories, automatic word processing, and long-term retention of knowledge and skills.

RN 97-39 Designing an Interactive Multimedia Environment for Learning and Aiding Troubleshooting, Kolodner, J.; Recker, M. September 1997. (AD A336 143)

The need for effective troubleshooting is rapidly becoming ubiquitous in our increasingly technological society. However, troubleshooting is a complex process both to learn and perform. This report examines the prospects for designing an interactive learning environment that helps users acquire and engage in effective troubleshooting. This work is

informed by two important strands of related research. First, we draw upon research focused on the design and development of interactive learning environments. We are interested both in work focusing on theory-driven design on multimedia, and work focusing on how students learn in apprenticeship learning situations. The research summarized forms the basis for a prototype design of an interactive multimedia environment. The prototype is designed for the task domain of help-desk troubleshooting of computer systems problems for a large computer company.

RN 97-40 Behavioral Determination of Accurate Verbal Communication: An Operant Behavior Analytic Approach, Parsons, H.M. September 1997. (AD A338 736)

An analysis of interpersonal communication was performed in terms of the operant paradigm's controlling variables, Skinner's taxonomy of verbal behavior, and the relationships between these. In contrast to formal syntactic and lexical analyses, these functional models emphasize why people speak as they do, rather than how and what. Deviating slightly from Skinner's terminology, the key operant variables, interacting through multiple contingencies, are effector (response), consequator (positive or negative reinforcer and aversive consequence), potentiator (deprivation and an aversive stimulation), and discriminator (discriminative stimulus). The verbal taxonomy's four major categories are mand and tact (which relate verbal to nonverbal behavior prescriptively or descriptively) and interverbal and autoclitic (in which components of verbal behavior are related to each other by recurrence or organization).

RN 98-01 Identification of Potential Combat Effectiveness Variables, White, R.A. (AD A338775)

This report describes a project whose purpose was to identify and, where possible, develop potential individual combat effectiveness variables (CEV). The project has its origin in the need for valid combat effectiveness criteria, to be used in validation of predictors of combat effectiveness. The problem was to identify and operationalize attributes, behaviors, and performances that will serve as potential CEVs. After identification and operationalization, potential CEVs can be validated and cross-validated in later studies and, where valid, can be used as criterion measures of combat effectiveness. In this project, modified behavioral event interviews were conducted with groups of combat-experienced soldiers. The interviews were recorded and transcribed. Then, intensive content analyses were conducted by three Subject Matter Experts (SMEs) The content analysis was devoted to identification of potential CEV.

RN 98-02 Army Community Service: ACS Unit Program Early Implementation Report, Orthner, D.K., Bowen, G.L., Mancini, J.A., Pond, S.A., & Stawarski, C.A. November 1997. (AD A338797)

The objectives of the Family Adaptation Project are to: (1) determine what constitutes good adaptation to Army life, (2) show how family adaptation is related to Army outcomes, and (3) design and test pilot programs that can improve how well families can adapt. The present report helps to meet the third objective by documenting the implementation of the pilot Army Community Service (ACS) Unit Program. The Unit Program requires the assignment of a single ACS staff member to interface with Army units and to ensure that they received the ACS services that they required. Both the process and outcome of making this change in the service delivery system were evaluated through individual and small group interviews and through a short questionnaire. Interviews were conducted with 10 Directors, 92 ACS staff members, 36 unit leaders, and 10 installation leaders who were in charge of some aspect of family support at the nine sites.

The ACS Directors felt that the main advantage of the program was that it improved ACS's knowledge of what soldiers, families, and commanders really needed. For the most part, the ACS staff was very supportive of the new program. The unit leaders were excited about the new program and what it could offer. They found it more "user-friendly" and more relevant (than the traditional program) to unit readiness. installation leaders were impressed with the team-focused, proactive nature of the new program. Their main concerns focused on the resources needed to adequately staff this effort.

RN 98-03 Personal Computers in the Light Infantry: A Survey on Office and Home Computers, Fober, G.W. & Stephens, R.L. III. February 1998. (AD A340880)

Computers with certain minimum hardware requirements are needed to perform information management functions and computer-based training (CBT). The purpose of this study was to determine the availability and features of computers for use by battle staffs. A survey was designed to obtain this information from Light Infantry brigades. The results from fourteen brigades indicated that variations in computer features existed. Further information was obtained by making the survey available to battalion and brigade units training at the Leaders Training Program at the Joint Readiness Training Center. A total of thirty-six units completed the survey. About half of the available computers were Pentiums with most of the remaining being 486s. Many of the computers lacking the necessary features could be inexpensively upgraded. It was concluded that CBT courseware developers should consider the target audience's hardware capabilities for running the software.

RN 98-04 Acquisition and Processing of Information During States of REM Sleep and Slow-wave Sleep, Mollon, J.D. January 1998. (AD A341361)

Review, analysis and summary of experimental literature on "Sleep Learning". Findings:

a. Serious methodological flaws found in all reported positive results. No evidence that semantic learning occurs when verbal material is presented to sleeping subjects.
b. A critical, but open-minded, test of sleep learning has not been done. Recommendations made for an appropriate experiment.
c. If novel material is presented to the sleeping subject, there is danger that it may interfere with normal nighttime processing of earlier, daytime experiences.

d. It is possible that external stimuli could be used to prompt and direct information processing during sleep to favor one set of material in preference to others. This could apply to skill learning as well as declarative memory with considerable potential relevance to soldier training.

RN 98-05 The Virtual Schoolhouse, Leddo, J., Kolodziej, J., Zhang, Z. & Beary, S. March 1998. (AD A341362)

The report describes a Phase I Small Business Technology Transfer (STTR) project in which a Distributed Interactive Intelligent Tutoring Simulation ™ (DIITS) was developed to train Army Infantry squad and fire team leaders the skills they need to cooperatively perform military operations in urban terrain (MOUT). The intelligent tutoring system technology allowed trainees to receive feedback and remediation regardless of whether or not a human instructor was present. The DIITS included intelligent agent technology to play the role of scenario agents when a human was not available to fill in. This gave the technology added power as it could be used for training regardless of the number of trainees available at the time. A scenario editor was also created to allow training scenarios to be developed by users. The intention of this was to increase the customizability of the technology to individual user needs. Finally, the technology was constructed to be generic and modular to support extension and reuse as training requirements evolve. These characteristics were demonstrated in several ways including the transfer of technologies across projects, the substitutability of modules across systems and the ability of the technology to respond to user-defined scenarios without further modification.

RN 98-06 Evaluation of ARI Leader Assessment Measures, Mathieu, J.E., Klimoski, R.J., Rouse, C.E., Marsh, W.M. April 1998. (AD A346233)

RN 98-07 Evaluation of ARI Leader Assessment Measures: Access Data Base, Marsh, W.M., Rouse, C.E., Mathieu, J.E. & Klimoski, R.J.

This project grew out of a need for a cataloging, synthesis, and review of measures designed to predict and/or assess leader effectiveness developed and/or used by the U.S. Army Research Institute over the past 10 years. The purpose of this report is to review featured ARI leadership measurement initiatives and compare them to benchmarks in nonmilitary research. The objectives of the effort were to (a) identify and describe major themes and initiatives by ARI leadership labs over the past ten years, (b) critically analyze resulting instruments according to specific and common evaluative criteria, (c) compare ARI initiatives against external benchmarks, and (d) to offer suggestions and guidance for future leadership research endeavors.

RN 98-08 Proposed Army Research Institute Support for Army After Next Experimental Unit, Graham, S.E. March 1998 (AD A344917)

The Army is discussing the creation of an experimental unit that can be used to evaluate and refine concepts being developed for the Army After Next (AAN). The purpose of this scripted briefing is to describe what the Army Research Institute (ARI) could do in support of an AAN Experimental Unit (EXUnit), should such an organization be established. The recommendations are based on well-established military psychology principles derived from decades of behavioral science research. In addition, critical research issues are identified that we believe need to be addressed.

ARI is prepared to help lead in the design and the utilization of the EXUnit. Our proposed effort uses a systems approach to organize, understand, and address AAN training and personnel performance issues. It is a systems approach in that there are explicit relationships between the various proposals. Among the components to be proposed are sequential selection, assignment, and training systems or subsystems. These systems will rely heavily on the development and use of virtual and constructive simulation environments for concept development and evaluation. Virtual prototypes of future weapon systems and organizational structures will need to be constructed as a means to empirically determine effective, if not optimal, job structures, personnel requirements, skill mixes, communication patterns, and tactics, techniques and procedures (TTPs).

Much of the focus is on enhancing the collective performance of AAN teams. This will require the development of AAN collective performance measures that can be used to assess the effectiveness of AAN teams or forces under realistic AAN conditions. In addition, there are several recurring themes that occur throughout this briefing. These include the development and refinement of AAN job structures based on a projected AAN front end analysis, along with the development of complementary AAN performance measures. We also highlight similarities between proposals and current Special Operations Forces (SOF) organizations and procedures. In certain cases we recommend the use of SOF as a testbed for the EXUnit proposals.

RN 98-09 The Role of Data Feedback Error in Inference and Prediction, Doherty, M., Tweney, R., Schipper, L. & O'Connor, R. June1998. (AD A348830)

The present research investigates two forms of uncertainty, defined operationally as error in the data, at two places within the information flow between the person and the environment. The two kinds were "measurement error" and "system failure error". The former involved adding a random variable to the data. The latter involved the sort of error, which occurs when an environmental source of data gives information unrelated to the causal or predictive process under study. These forms of error were studied in the data and also in the feedback of subjects.

RN 98-10 Army Missions for the Twentieth Century: Peacekeeping and Beyond, Segal, D. September 1996. (AD A347061)

This report discusses a research program on peace operations that used documentary evidence to study changes in the nature of multinational peacekeeping over time, interviews to analyze the ways in which soldiers experience and interpret peacekeeping, and surveys to

identify the ways in which soldiers and their families adapt to peacekeeping. Five phases of United Nations peacekeeping are identified. The ways in which soldiers impose meaning on peacekeeping are discussed. The adaptation of reserve component personnel and their families to peacekeeping is described.

RN 98-11 Senior Leadership: An Annotated Bibliography of Research Supported by the Army Research Institute, Zaccaro, S. J. June 1998. (AD A347087)

This report presents an annotated bibliography of research on senior leadership sponsored by the Army Research Institute primarily between 1985 and 1994. This research has covered themes related to the nature of work and performance requirements at the executive level, the knowledge, skills, abilities, and other characteristics needed to meet these requirements, the measurement of key senior leadership constructs, and the formation of development and training technologies for the inculcation of requisite leadership qualities. An examination of the parameters of this research indicates that (a) as a whole, this research has proceeded from a single coherent theoretical framework; (b) more than half of the products in this research base (63%) can be characterized as nonempirical; (c) one half of the empirical studies (50%) utilized primarily a qualitatively or descriptive research methodology; and (d) the nature of senior leadership work and requisite KSAOs has received more attention (53% and 58%, respectively of the entries) than measurement (23%) or specific development and training strategies (44%). The annotated bibliography presented here serves as the initial step in a critical analysis and review of the research on senior leadership generated by the Army Research Institute.

RN 98-12 Cognitive and Motivational Consequences of Tutoring and Discovery Learning, Reiser, B., Copen W., Ranney M., Hamid A., Kimberg D. June 1998. (AD A347269)

A central controversy in the design of instruction concerns the amount of freedom or guidance that should be provided to students. We examined the cognitive and motivational consequences of guidance and freedom in a learning environment used by students learning introductory programming. Students worked with one of three interactive learning environments that varied in the amount, of freedom to explore or guidance provided. We argue that discovery learning creates more opportunities for students to assess how well they can overcome obstacles, and their resulting attitudes toward their past and future success in the domain relies heavily on this type of attribution. The positive or negative nature of that attribution will depend on their relative success in achieving their goals.

RN 98-13 The Western European Military Establishment: A Re-Assessment, Harries-Jenkins, G. (Ed.) June 1998.(AD A347398)

This report considers the refinement of the conceptual framework to this research task and reviews the proceedings of a workshop held at Beverly, United Kingdom from 17th to 20th of November. Two revised national case studies are presented.

RN 98-14 The effects on recall and recognition of simple and complex numbers in arithmetic problems, Mason, J. D., Healy, A. F., and Marmie, W. June 1998. (AD A347304)

Two experiments are reported in which college students were given arithmetic problems with simple and complex numbers. Problems involved the accounting equation "current assets + noncurrent assets = total assets." Subjects were told to remember the total assets figure and, depending on the task, either read the equation, verify the total assets figure, or verify the current assets figure. Memory for the total assets figure was tested by recall and recognition procedures. Even when the to-be-remembered information was equated for both conditions, memory was greater for simple than for complex problems by both recall and recognition measures. However, task did not affect memory. Implications are suggested for the design of course materials that include arithmetic problems and examples.

RN 98-15 Detecting Phonemes and Letters in Text: Interactions Between Different Types and Levels of Processes, Schneider, V.1. & Healy, A. June 1998. (AD A347275)

In six experiments subjects detected phonemes or letters in text presented auditorily or visually. Experiments 1 and 2 provided support for the hypothesis that a mismatch between the phoneme and letter representations of a target leads to detection errors. In addition, visual word unitization processes were implicated. Experiments 3 and 4 provided support for the hypothesis that the Gestalt goodness of pattern affected detection errors when subjects searched for letters. Experiments 5 and 6 demonstrated that the effects of unitization on the detection of letters in common words were decreased by altering the familiar configuration of the test words. The combined results of all six experiments lead to the conclusion that both visual and phonetic processes influence letter detection, that these processes communicate through a type of cross-checking, and that there are at least two levels of visual (and perhaps of phonetic) processing involved in the letter detection task.

RN 98-16 Interpersonal Deception Theory: Examining Deception From a Communication Perspective, Buller, D., Burgoon, J., Buslig, A., & Roiger, J. June 1998. (AD A354018)

Interpersonal Deception Theory was tested in an analysis of verbal behavior in interviews characterized by falsification, equivocation, or concealment. It was predicted that language choice in deceptive interactions would reflect (a) strategic attempts to manage information and behavior through indirect, nonimmediate, and vague responses and (b) nonstrategic leakage of anxiety through humor. Also, senders were expected to be more indirect, nonimmediate, and vague and use more humor when suspected. Seventy-two non-expert adults and 6 experts from a U.S. Army intelligence school participated in a 3 (type of deception) X 2 (suspicion) X 2 (relational familiarity) X 2 (expertise) X 4 (type of response) within-subjects factorial design. As expected, deceptive responses contained more indirect, nonimmediate, and vague language, especially spontaneous and repeated deceptions. Planned deceptions may have contained more behavior management aimed at avoiding indirect and vague responses. Deception also contained humor. Suspicion increased indirect, nonimmediate, and vague language, but these cues are managed with friends and experts. Falsifications were most direct, nonimmediate, and vague.

RN 98-17 Analysis of Battlefield Function 20 (Direct and Lead Units in Execution of Battle) as Performed by a Digital Battalion Task Force, Mullen, W. J. III, Mcllroy, B. J. , Ford, J. P., Jarrett, P.A. , Huffman., J & Throne, M. H. July 1998. (AD A349412)

This report provides information concerning Battlefield Function (BF) 20, Direct and Lead Units in Execution of Battle, as performed by a battalion task force (Bn TF) which is digitally equipped. The components, or sections, of this analysis are products which can be used to support development of a training strategy for the Bn TF. This analysis identifies the critical tasks and supporting tasks undertaken by the Bn TF commander, his staff, and the subordinate/supporting commanders. The approach included revising and upgrading an existing Bn TF analysis, augmenting the analysis to incorporate processes associated with the digital enhancements currently available to the selected division, and conducting an external review.

RN 98-18 Representation in Skilled Mental Arithmetic, Rickard, Timothy J. (AD A350002)

Two experiments were performed to investigate the nature of skilled arithmetic performance. In Experiment 1, college subjects were trained extensively on a set of simple multiplication (e.g., __ = 4x9) and division problems (e.g., 56= __x8). They were then tested on each problem seen at practice, and on three altered versions of each practice problem; a change in operand order v (e.g., __ = 4x9 at practice, __= 9x4 at test), a change in operation (e.g., 4x9 at practice, 36= __ x4 at test). In Experiment 2, both multiplication and division problems were again presented at practice and test. In addition, half of the problems had the symbol "x" and half had the symbol "÷". On the immediate and delayed tests, subjects again solved four versions of each practice problem; the actual practice problem, a problem with the symbol reversed, a problem with the operation reversed, and a problem with both the symbol and operation reversed. Results from both experiments showed: (1) improvement in reaction time with practice follows a power law for a all tested problem types, (2) across practice, division is more difficult than multiplication, and problems with the symbol "÷" are more difficult than problems with the symbol "x", regardless of the actual arithmetic operation required, (3) transfer of learning is substantial across changes in symbol, and across a change in operand order for multiplication, but is at best minimal across all other changes that were tested, (4) there is good to excellent retention of RT improvements gained.

RN 98-19 Factors Influencing the Enlistment Aspirations and Decisions of Hispanic, Black, and White Male Youth, Morrison, D.R. and Myers, D.E. July 1998. (AD A349410)

Hispanics are the country's fastest growing minority group and will represent an increasingly larger share of potential recruits. Using longitudinal data from a nationally representative sample of high school sophomores and seniors we examined how Hispanic, Black, and white male youths' enlistment plans and behavior are influenced by their family background, ethnic and cultural influences, mothers' expectations, academic achievement, family formation plans, and local labor market opportunities.

RN 98-20 A Generation Advantage for Multiplication Skill and Non-word Vocabulary Acquisition, McNamara, D.S. & Healy, A. July 1998. (AD A349411)

The generation effect is extended to skill learning and the acquisition and long-term retention of facts stored in semantic memory. In two experiments subjects were trained in either a read or generate condition. In Experiment 1, subjects performed simple and difficult multiplication problems. A generation advantage occurred only for the difficult problems. In Experiment 2 subjects learned to associate non-word vocabulary terms with common English nouns. A generation advantage occurred, and in both conditions subjects using mnemonic strategies showed superior performance. The results are explained in terms of a procedural account of the generation advantage, and the implications of this research are discussed for instructional applications.

RN 98-21 Changing Patterns of Drug Use Among High School Seniors (1976-1995) Who Entered Military Service: Implications for Drug Abuse Prevention, Bachman, J., Freeman-Doan, P., O'Malley, P., Johnston, L., and Segal, D. July 1998. (AD A351836)

Early in the 1980's, the U.S. Armed Forces adopted a "zero tolerance" policies concerning illicit drug use, and later developed policies to discourage tobacco and alcohol abuse. This article examines patterns of drug use among young recruits both before and after enlistment, compared with age-mates who did not enter the military , and documents historical shifts across the past two decades. These analyses employed longitudinal panel data from 20 nationally representative samples of high school seniors (cohorts of 1975-1995). Each surveyed just before graduation, and again one or two years later. Separate analyses for men (N=11,977) and women (N=14,948) contrasted those who at follow-up were (a) in military service, (b) full-time students, (c) in full-time civilian employment. Overall, illicit drug use declined more among military recruits than their civilian counterparts. Further analyses of male recruits at multiple time periods showed sharp declines in (a) prevalence of marijuana, subsequent to initiation of routine military drug testing; (b) proportions of half-a-pack-a-day or more smokers electing to enter service, subsequent to tobacco bans during basic training. Conclusions suggest that recent military drug policies have had deterrent effects.

RN 98-22 The Effects of Proximal and Distal Goals on Strategy Development and Group Performance, Weldon, E. June 1998. (AD A349438)

I hypothesized that team members working toward proximal and distal goals would perform better than teams working towards distal goals alone, because team members would invest more time and energy in efforts to develop effective task strategies. As expected, team members in the proximal-plus-distal goal condition performed better than those in the distal-goal condition, and strategy development mediated this effect. Results also showed that goal level was an important mediator. Group members in the proximal plus-distal goal condition set more difficult goals, which led to better performance, compared to those who set distal goals alone.

RN 98-23 The Role of Self-Esteem and Self-Efficacy in Determining Responses to Performance Feedback, Davis, W. and Fedor, D. July 1998. (AD A349452)

Our research on the relationships between individual differences, feedback seeking, and reactions to feedback sought to identify and clarify the existing state of knowledge concerning these relationships. We identified five individual difference variables that have historically been included in empirical feedback studies. These are: self-esteem, self-efficacy, locus of control, achievement need, and tolerance for ambiguity. Within the identified research, feedback-related responses were classified into five categories: affective reactions to feedback (e.g., satisfaction with the feedback), cognitive reactions to feedback (e.g., perceived accuracy), feedback- monitoring (i.e., using indirect methods such as observing others to gain some performance information), feedback seeking (i.e., asking others for feedback), and other behaviors (often including performance following the receipt of feedback). The results of this investigation are summarized in Appendices A through E. In each appendix, the relationship between an individual difference and the responses given above are outlined. More specifically, the results for self-esteem are contained in Appendix A, for self-efficacy in Appendix B, for locus of control in Appendix C, for tolerance for ambiguity in Appendix D, and need for achievement in Appendix E.

RN 98-24 Effects Of Field Of View On Judgments Of Self -Location: Distance Estimations Using Planview Representations As A Function Of Observer Eye Station Points (ESP) And Geometric Field Of View (Fovg), Psotka, Joseph and Lewis, Sonya A. July 1998. (AD A349446)

The accurate location of one's (sometimes virtual) egocenter in a geometric space is of critical importance for immersion technologies. Self - location is a relatively unexplored component of size and distance estimations. This experiment was conducted to investigate the role of field of view (FOV) and observer eye station points (ESP) in the perception of the location of one's egocenter (the personal viewpoint) in virtual space. Fifty students viewed an animated 3D model, either of a similar room to the one where they sat, or of a space of round orbs of unfamiliar size, binocularly, from ESPs of either 1/2,1, 2, 3, 4, or 5 feet. The display was on a 190 by 245 mm monitor, at a resolution of 320 by 200 pixels with 256 colors. They saw six models of both the room or orbs designed with six geometric field of view (FOVG) conditions of 18, 28, 37, 48, 86, and 140 degrees. They drew the apparent paths of the camera in each model of the room on a bitmap image of the room as seen from infinity above. The results indicate that distance perception and self - location are substantially affected by the display field of view and the computed field of view of the synthetic environment. The errors in self - location may underlie the widespread findings of underestimation of distances in virtual worlds and computer - generated imagery. They may also contribute to a better understanding of the many findings of simulator sickness in realistic tank and helicopter trainers. These results offer a new understanding of the phenomena that maybe create solutions for improving training and real - time use of computer - generated imagery.

RN 98-25 Preliminary Evaluation of the Kaiser View ™ Display System, Howse, W. R. & Cross, K.D. July 1998. (AD A349861)

An evaluation of the prototype Kaiser Electronics View ™ Display System was conducted in conjunction with a study of the Army Tactical Command and Control System (ATCCS) during the first week of March 1998 at the request of the U.S. Army Aviation Center

Directorate of Training, Doctrine and Simulation. The evaluation is based on responses of first-time users in a command and control environment. A questionnaire was developed to assess user impressions relating to a range of human factors aspects of the prototype helmet display system. This report contains a brief description of the evaluation method and findings. The responses indicate that the system is feasible as a tactical command and control display in a ground-based installation. The display system appears to have no disqualifying attributes. The utility of the display would be improved with an increase in display spatial resolution.

RN 98-26 The Long-Term Retention of Knowledge and Skills, Healy, A., Clawson, D., McNamara, D., Marmie ,W., Schneider, V., Rickard, T., Crutcher, R., King, C., Ericsson, A. K. & Bourne, L. Jr. July 1998. (AD A349869)

We received three classes of guidelines we found to optimize long-term retention. The first class concerned ways to optimize the conditions of training. We discussed three general guidelines in this class. The first concerned the contextual interference found, for example, with random sequences of tasks as opposed to fixed or predictable sequences. The second concerned training parts of a task versus the whole task. The third concerned the distinction between generating and reading. The second class of guidelines concerned ways to optimize the strategies used. We found that in tasks that require deliberate retrieval from memory, training that promotes efficient encoding strategies maximizes long-term retention. The third class of guidelines concerned ways to attain direct access, or automatic retrieval, from memory. We found in several domains that achieving automaticity requires extensive practice. Further, even when retrieval appears automatic after extensive practice, mediators may still continue to exert their influence.

RN 98-27 Is There Really Very Rapid Forgetting from Primary Memory: The Role of Expectancy and Item Importance in Short-Term Recall, Cunningham, T., Healy, A., Till, R., Fendrich, D. & Dimitry, C. July 1998. (AD A349863)

In two experiments subjects recalled one of two letter segments following a digit-filled retention interval. In Experiment 1, recall expectancy was manipulated by using precues that correctly informed or misinformed subjects concerning which letter segment would be tested for recall. In Experiment 2, item importance was varied by precuing one segment as important but requiring that the uncued segment be recalled first. Recall performance was very low under conditions of low expectancy and low segment importance, but the slopes of the retention functions did not demonstrate more rapid forgetting than under standard conditions. The previous observations of very rapid forgetting from primary memory may be a function of an elevated initial recall level in the earlier studies. Our retention functions were compared to predictions of the Estes perturbation model. The findings suggested that when secondary memory processes were reduced, forgetting order information from primary memory occurred at the same rate as that estimated on the basis of previous studies using the standard distractor task.

RN 98-28 Comparative International Military Personnel Policies, Harries-Jenkins, G. July 1998. (AD A350707)

This report looks at the problems associated with the recruitment and employment of military personnel in Western industrialized society. It is particularly concerned with issues relating to the recruitment and retention within the military of homosexuals, that is, those individuals who have a sexual propensity for persons of their own gender. After reviewing the legal definitions of homosexuality, homosexual acts and homosexual offenses, the Report concentrates on issues of policies, practices and problems. These are analyzed in the context of seven countries (Belgium, France, Germany, Italy, and the Netherlands, Scandinavia and the United Kingdom). Ten national reports are presented.

RN 98-29 Measuring Battlefield Knowledge Structures: Test of a Protocol Analysis Approach, Rex R. Michel (ARI). August 1998 (AD A350599)

This document reports on the design and testing of a method and measures for evaluating the battlefield domain knowledge structures of US Army officers. The method and measures were based on a review of the literature on expertise summarized in this report. Three different tactical situations were presented to 31 Army Officers with varying levels of relevant tactical experience. Each situation had a different response requirement intended to provide various measures of the integrity of the officer's knowledge base and the levels of abstraction and application it contains. The response verbal protocols were analyzed to derive the measure values. The results indicated a generally negative relationship between experience and high scores on the knowledge structure measures contrary to expectations. Possible reasons for the findings are discussed.

RN 98-30 Development of M1A2 Tank Platoon Exercises for Use in the Close Combat Tactical Trainer (CCTT), Holden, William T. and Forrest, Don; Gray, Raymond E. August 1998. (AD A352141)

This Research Note (RN) describes the development of M1A2 tank platoon exercises initiated as an added effort to the Structured Training for Units in the Close Combat Tactical Trainer-2 (STRUCCTT-2) Project. The effort had two objectives: to determine if the current CCTT M1A2 Intervehicular Information System (IVIS) system software replicates the actual fielded system with sufficient fidelity to provide positive training for the M1A2 tank crew; and to determine if the exercises that had been developed by the STRUCCTT and STRUCCTT-2 projects could be modified to provide interim M1A2 tank platoon training until the CCTT could be upgraded to support digital unit training. The RN describes the background for developing the exercises, covers some of the design considerations developed during the effort, provides an outline of the exercises that were created, and provides several lessons learned by the team undertaking the effort. The RN concludes with recommendations for further development of the CCTT to support digital unit training.

RN 98-31 Army Community Support Programs and Army Families: A Review of the Findings, Schumm, W. R., Bell, D. B., and Tran, G. September 1998. (AD A356094)

During the late 1980's soldiers and family members were asked a series of questions about the Army's social and recreational services in four world-wide surveys: the DoD Family Survey (1985), The Annual Survey of Army Families (1987), The RAND Corporation Survey

(1987), and the Army Family Research Program or AFRP Survey (1989). Specifically, the respondents were asked whether they used given services, were satisfied with it, and what benefits they derived from such services. The purpose of this report is to provide insights into what these services actually do by contrasting what different groups of respondents (e.g., officers, enlisted soldiers, and spouses) and different surveys say about these services. In addition to summarizing the findings, the report also makes recommendations (where appropriate) for how to improve given services.

RN 99-01 Linking Leadership Emergence to Leadership Effectiveness and Team Performance in a Military Population, Foti, R.J., Hauenstein, N.M.A., and Sgro, J.A. October 1998. (AD A354192)

Study of individual traits on the emergence of leaders in a team and the impact on subsequent performance.

RN 99-02 The American Soldier after the Cold War: Towards a Post-Modern Military? Moskos, C. October 1998. (AD A354194)

Sociological examination of the evolution of military organization in Western developed democracies.

RN 99-03 Effective Span of Command and Control by Echelon in Training and Operational Environments, Ford, J.P., Mullen, W.J. III, and Christ, R.E. October 1998. (AD A355164)

In response to reduced resources in the face of more diverse missions, Army leadership is considering new options for the design of its organizations. One option is to create 'flatter' organizations. A consequence of this option is an increase in the span of command and control, and a concern with its impact on the effectiveness of command and control. This report summarizes research conducted to develop a database of information pertaining to seven factors proposed to influence the span of effective command and control, and guidelines for designing and training units that maintain effective spans of command and control. Fifty-five Army officers at various echelons and from different types of units participated in interviews. The resulting database is a set of comments and ratings about the relation between each of the seven factors and the difficulty (or ease) of command and control. The research confirmed the usefulness of the seven factors for discussing issues impacting span of effective command and control. The data were consolidated into observations that pertain to organizing and training military units. This report: (a) presents the results of this research, (b) recommends modifications to the data collection procedures, and (c) proposes further applications of the approach.

RN 99-04 The Military Language Tutor (MILT), Kaplan, J.D., Sabol, M.A., and Wisher, R.A. November 1998. (AD A356902)

MILT is a military foreign language tutor and an authoring. MILT joins the strengths of pervious computer-based approaches to language training with emerging technologies from the fields of computational linguistics, computer science, and electrical engineering to form an

innovative, interactive tutor in a Pentium-based laptop computer. The first version of MILT with keyboard input was designed for Spanish and Arabic and can recognize tens of thousands of common words and hundreds of military terms in each of these languages. Its major software engine is a natural language processor (NLP). The goal of the MILT design team was an authoring system which would require no formal external training and which could be learned within four hours by anyone familiar with the Windows environment, even someone with no programming experience, using only documentation and internal MILT help functions. In MILT-DSR (discrete speech recognition), students are given an exercise which allows them to use language production to manipulate a graphics microworld. At Fort Campbell using 5th Special Forces Group personnel a field evaluation was conducted in early June, 1997. For each evaluation, two types of data were collected: (a) student attitudes toward the tutor and (b) instructional effects of the tutor.

RN 99-05 Continuous Speech Recognition in a Language Tutor – Using Learning Principles to Alleviate Underlying Problems, Kaplan, J.D. and Holland, V.M. December 1998. (AD A356900)

This paper describes the instructional features of the Military Language Tutor (MILT), how they were shaped by principles of learning and memory drawn from work in experimental psychology, and how these approaches are being used to deal with the problems of continuous speech recognition in a tutor.

RN 99-06 Human Performance in Simulation Workshop, Johnson, E., Moses, F. and Psotka, J. November 1998. (AD A357596)

Overview and summaries of presentations at the Human Performance in Simulation Workshop, 30-31 July, 1997.

RN 99-07 Human and Organizational Issues in the Army After Next: A Conference Held 13-15 November 1997, Drillings, M., Adelman, L., Manzo, A., and Shaler, M.D. November 1998. (AD A357651)

Notes and briefings from the 1997 Army After Next Conference.

RN 99-08 Human and Organizational Issues in the Army After Next- II: A Conference Held 24-26 June 1998, Drillings, M., Adelman, L., Manzo, A., and Shaler, M.D. November 1998. (AD A358346)

Notes and briefings from the 1998 Army After Next Conference.

RN 99-09 New Research on Span of Command and Control: Implications for Designing Army Organizations, Ford, J.P., Mullen, W.J. III and Christ, R.E. December 1998. (AD A358571)

From September 1993 to March 1994, a team of two behavioral scientists and a retired general officer interviewed 55 Army officers on factors that affect the span of effective command

and control. The interviews were structured around seven factors: Task Characteristics, Organizational Structure, Complexity of Environment, Unit Continuity, Technology, Individual Characteristics, and External Organizations. The first section of this report presents recommendations on forming a joint task force for contingency operations. These recommendations are keyed to comments made during the interviews by 11 general officers who held senior positions in contingency operations. The second section presents conclusions and recommendations for organizing Army units for warfighting operations. These conclusions and recommendations are based on ratings and comments made by officers at echelons from company to corps and from combat, combat support, and combat service support units. Ratings on the impact of each factor as well as comments made during the interviews suggest that the impact of the factors varied as a function of both echelon and type of unit. Recommendations for design are drawn from the study conclusions about each factor as well as directly from those made by some officers.

RN 99-10 Documentation and Archival of Selected ARI Data Bases Final Project Summary Report- Phase I, DiFazio, A.S., Young, W.Y., and Drissen, D.P. January 1999. (AD B241154)

Since 1975, the U.S. Army Research Institute (ARI) has collected a wide array of Manpower Personnel Research (MPR) data in support of its research activities. Until this current effort, there have been no formal procedures or guidelines for the documentation and archive of these numerous databases. The ability of new users to access and utilize extant ARI data, whether collected by ARI staff or by outside contractors, is heavily dependent on the knowledge of those ARI staff members who worked most closely with the data. With organizational turnover and downsizing , critical information needed to access and use data by new users will be lost over time. As Phase I of a two-phase effort, the Human Resources Research Organization (HumRRO), and Fu Associates were awarded a contract to develop standards for documentation and archive of extant ARI datasets. The development of these documentation and archive standards is the subject of this report.

RN 99-11 Data Base Documentation Standards for Extant Datasets, DiFazio, A.S. and Young, W.Y. January 1999. (AD A359256)

Since 1975, the U.S. Army Research Institute (ARI) has collected a wide array of Manpower Personnel Research (MPR) data in support of its research activities. Until this current effort, there have been no formal procedures or guidelines for the documentation and archive of these numerous databases. The ability of new users to access and utilize extant ARI data, whether collected by ARI staff or by outside contractors, is heavily dependent on the knowledge of those ARI staff members who worked most closely with the data. With organizational turnover and downsizing , critical information needed to access and use data by new users will be lost over time. As Phase I of a two-phase effort, the Human Resources Research Organization (HumRRO), and Fu Associates were awarded a contract to develop standards for documentation and archive of extant ARI datasets. The development of these documentation and archive standards is the subject of this report.

RN 99-12 Analysis of Linkages Between Military Enlistment Plans and Behaviors, Freedman-Doan, P. and Bachman, J.G. February 1999. (AD A359848)

The Office of the Deputy Chief of Staff for Personnel assigned the Army Research Institute (ARI) to identify and to evaluate factors that influence military enlistment propensity, the enlistment decision, and military career progression. As a part of that effort, researchers at the University of Michigan's Institute for Social Research contracted to analyze relevant data collected as part of the Monitoring the Future (MTF) survey from high school seniors and young adults. The MTF data set is unique among social science data collections because of its large national random samples and its cohort sequential design. Each year since 1975, random samples of approximately 17,000 high school seniors per year have provided responses to a 5-minute paper and pencil self-administered questionnaire. Approximately 2,400 young persons from each senior class are selected for follow-up data collections. Each young person in the follow-up is mailed a questionnaire every two years until reaching age 35. This cohort sequential design allowed MTF researchers to examine a variety of issues directly related to the change given to ARI by the Office of the Deputy Chief of Staff for Personnel.

RN 99-13 The Relationship of Team Goals and Team Strategies to Team Performance, Locke, E.A. February 1999. (AD A359852)

Six studies were conducted under the contract. Four were laboratory studies and two were field studies. The common theme of the studies was the relationship of team goals and team strategies and tactics to team performance. Each study explored these relationships from a different perspective.

RN 99-14 Personality, Motivation and Cognitive Performance, Revelle, W. and Anderson, K.J. February 1999. (AD A359851)

This project examined the determinants of efficient cognitive performance. Specific questions addressed how environmental stressors combine with time of day and individual differences in personality to affect motivational variables that in turn affect components of information processing.

Our research addressed three separate objectives: 1) to do systematic taxonomic work on the relationship between personality traits, situational moderators, and activational states; 2) to develop and test models of stable individual differences and transient affective states as they affect the detection, encoding, storage, and processing of information; and 3) to test and revise our models of motivational effects upon complex cognitive performance.

Results showed that individual differences in temperament combine with a variety of stressors (e.g., time of day, exercise, stimulant drugs, feedback) to affect two components of motivational intensity, energetic arousal and tense arousal, and one of motivational direction. The two components of arousal have systematic effects on performance on a variety of simple and complex cognitive tasks. Cognitive performance measures examined included complex problem solving as well as attention, learning, memory and performance tasks. New techniques

were developed that demonstrated the importance of within subject variation in energetic and tense arousal.

RN 99-15 Addendum to "Evaluation of ARI Leader Assessment Measures", Mathieu, J.E., Klimoski, R.J., Rouse, C.E., and Marsh, W.M. February 1999. (AD A359876)

Addendum to Research Note 98-06. This document contains the complete inventory of assessment measures evaluated, with capsule summaries of each.

RN 99-16 Use of a Joint Battlefield Function Analysis to Produce Training Source Materials, Love, J.F. December 1998. (AD A359971)

Training front-end analysis materials and self-assessment procedures developed in the earlier phases of the Joint and Multi-Service Distributed Training Testbed (JMDT2) program were compiled in the form of a resource document, here called a guidebook. This report discusses the use of a joint fire support battlefield function (BF) analysis as the resource from which staff responsibilities were extracted and detailed task descriptions developed. Training progress self-assessment procedures were also drawn from the BF analysis. The resulting materials provided bases for conducting mini after action reviews. The focus was on the staff sections responsible for joint fires operations in an Army Corps Joint Task Force exercise.

RN 99-17 Expert Approaches to Analysis, Collins, A. and Ferguson, W. March 1999. (AD A360743)

Study of how scientists and military analysts make sense of complex situations with the goal of developing an elaborated theory of epistemic forms and games, which can form the basis for building a tool to support expert analyses.

RN 99-18 Training-based Requirements for Semi-Automated Forces, Kornell, J. March 1999. (AD A360749)

Effective use of current and planned semi-automated forces (SAF) capabilities is important to maintain Army readiness. To guide commanders in specifying training requirements using SAF, a model of how instruction and training can use SAF is needed. The objective of this research reported here has been to build a foundation for such a model. The long-term goal is to construct a knowledge-based system to aid commanders in translating objectives to training requirements.

RN 99-19 Is There a Gap Between Soldiers and Civilians? Comparing the Political Attitudes of Young Recruits with Their Non-Service Peers, 1976-1997, Freedman-Doan, P., Bachman, J.G. and O'Malley, P.M. March 1999. (AD B242250)

To what extent are there differences in political orientation between personnel in the United States military, on the one hand, and civilian political leaders and the general populace, on the other hand? This question has been the subject of much recent theoretical reflection (Avant, 1998; Desch, 1998; Feaver, 1996, 1998; Foster 1998; Kohn, 1994), journalistic

investigation (Ricks, 1997a, 1997b; Page 1997). and empirical research (Holsti, 1997). Do military personnel have a distinctive set of political attitudes that separate them from the citizenry they serve? What, if any, is the degree of difference between the ideological composition of the armed forces and the United States populace or its civilian authorities? Many commentators seem to agree with Kohn that the "U.S. Military is now more alienated from its civilian leadership than at any time in American history, and more vocal about it." (For a more nuanced conclusion see Holsti, 1997.) If the members of our armed forces do indeed hold a set of political attitudes that differ from the populace they protect, does that constitute a threat to civilian control? Our purpose here is to extend the empirical research into the ideological composition of the U.S. military. Using national random samples collected over the last twenty years, we examine the political attitudes, values, and behaviors of young male recruits both before and after they begin their military service. We compare young servicemen with age-mates who did not enter the military. We also document historical shifts across the past two decades.

RN 99-20 Setting the Standard: When Peacekeepers May Shoot to Kill, Lawlor, B.M. and Lawlor, E.J. March 1999. (AD A361138)

U.S. Army forces are increasingly called upon to engage in peacekeeping missions in settings characterized by crowded, urban environments, where ready identification of friend or foe is difficult. Rather than facing well-defined organized forces, they often confront isolated instances of hostile actions, perpetrated by persons who blend into the general population. The purpose of this report is to document a Soldier Rules of Engagement (SROE) that may be used to govern when U.S. soldiers may employ their individual weapons in self-defense against foreign citizens. Utilizing pervious work with "shoot/don't shoot" standards developed by civilian police agencies, and common standard was developed for application in military settings by soldiers. The standard requires soldiers to ask three basic questions: 1) Does the threat have the ability to inflict harm? 2) Does the threat have the opportunity to inflict harm? And 3) Am I, or a fellow soldier, at risk of injury? If the answer to each of these questions is yes, then the use of deadly force is authorized. This standard is easy for the soldier to understand, remember, and apply. It is not mission dependent and will not change from one operation to another.

RN 99-21 Feedback on 360 Degree Leader AZIMUTH Check Assessment Conducted at Fort Clayton, Panama, Karrasch, A.I. and Halpin, S.M. March 1999. (AD A361832)

This report documents military and civilian leaders' reactions to a multi-rater assessment of their leadership behaviors. The 80 targeted leaders were commissioned and non-commission military officers, and GS-9 to GS-14 civilian leaders at Fort Clayton, Panama. After completing the Leader Azimuth Check and receiving feedback, they were asked to complete a survey designed to assess 1) perceptions of trust and the fairness in the multi-rater process, 2) reported understanding of the multi-rater process, 3) beliefs about the accuracy and appropriateness of the sources of feedback and 4) self-efficacy and intentions for change in leadership behaviors. An overview of the responses to the survey are recorded in this report. Subordinates were overwhelmingly viewed as the most valuable source of feedback. Eighty

three percent reported that they would use their feedback to monitor and develop their leadership. Motivation to change leadership behavior was best predicted by the extent to which leaders believed the feedback they received was new information. Trust in the confidentiality of the multi-rater process was high, as was the reported understanding in the purpose and methods of the 360. Perceptions of fairness and satisfaction were moderate to high. Perceptions of fairness and accuracy predicted satisfaction with the multi-rater process. Other predictors are mentioned in the report. Implications and recommendations are provided.

RN 99-22 What Soldiers Say About Night Operations, Volume II: Appendixes, Dyer, J.L., Pleban, R.J., Camp, J.H., Martin, G.H., Law, D., Osborn, S.M., and Gaillard, K. April 1999. (AD B243378)

A trend analysis of issues surrounding night operations, specifically the deliberate night attack, was conducted. The initial analysis was done in 1992-1993; the follow-on analysis in 1998. During this period, additional night equipment was fielded to units as a result of the Army's "Own-the-Night" effort. In each phase of the research, soldiers and leaders from different infantry units as well as the Joint Readiness Training Center (JRTC) observer/controllers (OCs) and opposing force (OPFOR) participated in surveys and follow-on interviews. The tasks and subtasks examined were based on the Mission Training Plan for the deliberate night attack. Areas that remained problems over the six-year period were identified, and soldiers' reasons for these problems delineated. There was high agreement over time regarding problems within each group surveyed and across groups. The JRTC OPFOR had the most unique perspective on problems. Most operational changes reflected the changes in equipment available to units. New equipment solved some operational problems, but often raised new training and employment issues. The difficulty with some areas was not a function of equipment, but related more fundamentally to soldier, leader, and unit expertise and discipline during night operations. Volume I (ARI Research Report 1741) is the main report.

RN 99-23 Augmented Selection Criteria for Enlisted Personnel, Ramsberger, P.F., Laurence, J.H., McCloy, R.A., and DiFazio, A.S. April 1999. (AD A363068)

The Armed Forces Qualification Test (AFQT), a composite of math and verbal scores, is used to determine eligibility for entry into the Armed Services. The goal of this project was to identify characteristics of individuals scoring below average on this test which differentiated those who can or cannot perform successfully in various jobs in the Army. The AFQT is part of a test battery known as the Armed Services Vocational Aptitude Battery (ASVAB). When the ASVAB was put into place in 1976, there were undetected flaws in the method used to determine appropriate percentile scores in reference to the normative population. Because of this "misnorming," many recruits were accessed who, if the misnorming had not taken place, would have been identified as belonging in below average AFQT categories. This misnorming continued until it was discovered and corrected in 1980. This project examined data on over 150,000 soldiers who were accessed during the misnorming period. Predictor variables examined included ASVAB subtest scores, interest measure scores, educational background, and demographic variables. These were linked to the following outcome measures: attrition, reenlistment eligibility, performance on a written job knowledge test, the Skill Qualification Test (SQT), and junior grade (to E-4) promotion rate. Analyses focused on

the relationship between predictors and outcome for those identified as below average scorers on the AFQT. Major findings included these: diploma status was best at predicting attrition and also tended to be the best predictor of promotion. A group of cognitive ASVAB subtests were superior predictors of performance on the job knowledge test.

RN 99-24 Optimizing the Long-Term Retention of Skills: Structural and Analytic Approaches to Skill Maintenance Annual Report, 1991-1992, Healy, A.F., Ericsson, A., and Bourne, L.E. Jr. April 1999. (AD A362103)

This research program seeks to identify the characteristics of knowledge and skill which are most resistant to decay due to disuse. The general goal is to elucidate principles which will specify those aspects of a complex skill that resist decay over periods of disuse and how they are distinguishable from more fragile components. The research program can be divided into two complementary parts. The first part is concerned with describing the structure of existing skills. The second part is concerned with experimental analysis of factors influencing and improving retention of skill components. Our work encompassed a large number of different studies on a wide range of tasks, including tank gunner skills, Morse code reception, color naming, instrument panel scanning, mental calculation, memory for instances of categories, target detection, data entry, components of memory for lists, components of memory for schedules, and vocabulary retention. Each of these tasks provided a test bed for our major theoretical hypothesis that the durability of memory depends critically on the extent to which learning procedures are reinstated at test.

RN 99-25 Modification of the Computerized Adaptive Screening Test (CAST) for Use by Recruiters in All Military Services, McBride, J.R. and Cooper, R.R. April 1999. (AD A362350)

The Computerized Adaptive Screening Test (CAST) was designed to predict performance on the Armed Forces Qualification Test (AFQT). It includes two subtests: Word Knowledge (WK) and Arithmetic Reasoning (AR). CAST has been used by Army recruiters since the early 1980's to prescreen enlistment prospects. The Joint Recruiting Information Support Systems Program Management Office (JRISS PMO) program requested modifications to CAST to make it suitable for use by recruiters in all of the U.S. military services. This report documents the development of CAST, Version 5.

RN 99-26 Research Into the Use of Speech Recognition Enhanced Microworlds in an Authorable Language Tutor, Plott, B., Hamilton, A., Princen, E., LaRocco, C.S., Morgan, J., and Kaplan, J.D. April 1999. (AD A362359)

An earlier ARI sponsored MILT project was designed to investigate the possibility of using natural language processing (NLP) software to identify semantic and syntactic errors and provide the basis for state of the art dialogue exercises.

One of the thirteen exercise types developed was the microworld exercise. A microworld is a software environment in which students can issue commands that are executed by animation routines in a game like atmosphere. Once the first microworld exercise was completed and

integrated into MILT, ARI funded the investigation of the use of discreet speech recognition technology in language learning using the microworld exercise as a basis.

The goal of this current effort was to expand the capabilities of MILT and incorporate continuous speech recognition for Arabic, Spanish and English. The overall objective of this project was to develop a general purpose, authorable, microworld that utilizes continuous speech recognition. The central tasks were 1) the design of an enhanced microworld exercise, 2) development of continuous speech recognition components for English, Arabic, and Spanish, 3) incorporation of speech recognition into the microworld exercise, and 4) expansion of the Arabic natural language processing (NLP) system.

RN 99-27 Do Individual Differences in Motoric and Rhythmic Skills Intercorrelate? Collier, G. May 1999. (AD A363978)

Explores the role of rhythmic behavior in motor control and tests the hypothesis that individual differences in rhythmic abilities are reflected in motor skills in general.

RN 99-28 Platoon Readiness as a Function of Transformational/Transactional Leadership, Squad Mores, and Platoon Cultures, Bass, B. and Avolio, B. May 1999. (AD A364116)

The objective of this research is to determine to what extent military readiness of platoons and their leadership as measured by their performance in JRTC and NTC can be predicted by the transformational and transactional leadership of the Platoon Leaders, Platoon Sergeants, and the overall Platoon in garrison.

RN 99-29 Tacit Knowledge for Military Leaders: Lessons Learned Across Organizational Levels, Hedlund, J., Sternberg, R.J., Horvath, J.A., Forsythe, G.B. and Snook, S. June 1999. (AD A364550)

This product is an extension of a project that defined and measured tacit knowledge for leadership among U.S. Army officers. The project researched tacit knowledge for leadership at three different levels of command and developed tacit knowledge assessment inventories for each level. The project is described in detail in ARI Technical Report 1080 (Hedlund et al, 1998) which is referenced in this document. During conduct of the research both common themes and distinct categories of tacit knowledge emerged across the three levels of command (platoon, company and battalion). This report discusses how the categories compare to the general dimensions of leadership identified by other researchers and what these categories reveal about the primary leadership challenges at the three command levels. Good and bad responses to inventory items as rated by experts are compared with the responses of practitioners rated as effective or ineffective leaders by their subordinates, peers or superiors. These data allow the identification of specific response patterns associated with effectiveness ratings from various sources and provide insights into why effective leadership is viewed differently from different perspectives. The findings have implications for the complexity and training of Army leadership.

RN 99-30 Documentation and Archival of Selected ARI Data Bases, Phase II: Final Summary Report, DeFazio, A.S., Young, W. Y., Driessen, D.P., and Peck, D. June 1999. (AD A364998)

Since 1975, the U.S. Army Research Institute (ARI) has collected a wide array of Manpower Personnel Research (MPR) and Training data in support of its research activities. Until this current effort, there were no formal procedures or guidelines for documenting and archiving these numerous databases. The ability of new users to access and use extant ARI data was heavily dependent on the knowledge of those ARI staff members who worked most closely with the data. With organization turnover and downsizing, critical information needed to access and use data would have been lost over time. This project had two phases. The first Phase developed documentation and archive standards for extant and future ARI data. Phase II, the focus of this report, applied those standards to specified extant data. The technical approach and procedures used in Phase II of this project is the subject of this report.

RN 99-31 Expanding the Concept of Quality Personnel: Final Report, Peterson, N.G., Anderson, L.E., Crafts, J.L., Smith, D.A., Motowidlo, S.J., Rosse, R.L., Waugh, G.W., McCloy, R., Reynolds, D.H. and Dela Rosa, M.R. June 1999. (AD A365308)

This report describes a project designed to determine if new predicators of performance which could increment currently available operational or experimental aptitude measures could be identified. The focus of prediction was performance of army non-commissioned officers (NCO). New tests of NCO situational judgment, prioritization skills, and self efficacy were examined in terms of what they could add in terms of predictive power to a set of available measures—a cognitive composite, a spatial test, and a temperament measure. These were linked to a composite criterion measure based on a structured interview, supervisor behavioral ratings, and supervisor situational ratings.

New and existing measures were administered to 691 non-commissioned officers across four grade levels. The situational judgment test and a situational self-efficacy measure had moderate correlations with a composite criterion and each added a small increment to the validity generated by a combination of the existing predictors. It appears that situational judgment tests and self-efficacy measures have promise in predicting leader performance although most of the predictive variance they provide may be shared with that of tests of cognitive ability and temperament.

RN 99-32 Joint Fires Training Guide for a Corps Joint Task Force, Love, J.F. December 1998. (AD A355818)

A detailed analysis of responsibilities, inputs, processes, outputs, and interactions was conducted for the staff elements and cells involved in joint fires at the Corps Joint Task Force level. This research product documents that analysis. The purpose of the product is to provide a source document for developing training self-assessment checklists for use in future joint training research at the Corps level. The checklists would be used by staff cells or elements to conduct mini after action reviews (sometimes referred to, in the joint community, as facilitated after action

reviews). However, the product can also help joint training managers plan scenarios and mission sequence event lists for simulation-based exercises.

RN 99-33 Assessment of Two Computer Based Products: The Military Decision-Making Process and the Brigade Battle Captain, Fober, G.W. September 1999. (AD A368209)

This report documents the user evaluation of two prototype-training products originally designed for the Joint Readiness Training Center (JRTC). The products are a computer-based, stand alone, training package designed to assist individuals and staffs of light infantry brigades in learning to participate in the military decision making process (MDMP) and a program geared toward the responsibilities of the Brigade Battle Captain. The courses are based on doctrine and also contain numerous tactics, techniques, and procedures that will assist staff officers in understanding and mastering their individual skills and their roles in the collective process. Based on user feedback, these programs appear to be successful.

RN 99-34 Army Leadership in the 21st Century: A Proposed Research Framework, Zaccaro, S.J., Klimoski, R.J., and Gade, P.A. September 1999. (AD A368441)

This report presents a framework for future research on Army leadership. Seven key themes, reflecting research on leadership models, tools, and problematics are suggested: (1) Defining and assessing leader effectiveness, (2) Identifying and assessing leader potential, (3) Leadership development as an integrated system, (4) The management of change, (5) Leader performance under adversity, (6) Leadership and the development of subordinate personnel, and (7) Leadership of retention. Specific research questions relating to each of these themes are also suggested. Example research programs addressing the four problematics are also provided. These examples were derived from contributions by several military and academic researchers at a conference convened by the authors to consider this research agenda.

RN 99-35 Developing a tool kit for the assessment of Army leadership processes and outcomes: Version 1.0, Zaccaro, S.J., Klimoski, R.J., Boyce, L.A., Chandler, C., Banks, D., and Gade, P.A. September 1999. (AD A368448)

This report provides a leadership performance measurement "tool kit", or battery of measures that have been identified as "best practices" for assessing leadership effectiveness, with special attention to effects in the context of organizational change. During an ARI/GMU sponsored workshop, military and civilian leadership researchers identified existing measures, assessment strategies, or measurement templates within a conceptual framework for organization of leadership assessment measures. The framework is organized along three dimensions: leadership processes and outcomes, organizational level, and level of analysis. Several measures were recommended and reviewed for inclusion based on several criteria (e.g., user-friendly, broad in scope, military face validity, documented research record with sound psychometric evidence). The resulting 15 assessment measures or templates with descriptions, summary of psychometric evaluations, application and source information, as well as references and suggested reading list are included. While measures were identified for each cell of the framework, leadership processes for lower, middle, and upper level leaders, targeting individual, dyad, and team levels of influence were strongly supported. Unit leadership at the upper level processes, however,

received less assessment support. Further, the outcome measures lacked "hard" behavioral measures. Recommendations for further research on assessment tools regarding these and organizational levels of analysis were suggested. Template measures, such as the observer/controller ratings, mission accomplishment, and readiness indices also require further research. Researchers using the measures in this tool kit are asked to facilitate continued development of the measures and the tool kit. This tool kit provides a basis for Army leadership research, further work is needed to expand and validate the leadership assessment measures.

RN 99-36 High Payoff Tasks for Training Soldiers and Small Unit Leaders in Virtual Environments, Pleban, R.J. September 1999. (AD A368698)

This report describes a multi-tiered process for identifying potential high payoff tasks for training small unit dismounted Infantry soldiers in simulated urban operations. Two recently created lists of Infantry tasks and battle drills were evaluated. Four selection criteria were applied: 1) the capability of current and near-term individual combatant simulator systems to support specific task-related behaviors; 2) the potential transfer effectiveness of practicing these tasks in a virtual environment; 3) the frequency with which task components (behaviors) are performed and; 4) the cost effectiveness/feasibility of performing the task in the virtual environment. Five tasks and five subtasks were retained for subsequent development into training scenarios. The tasks included Assault, Move Tactically, Enter Building and Clear a Room, Reconnoiter Area, and React to Contact. The subtasks included Engage Targets with an M16A1 or M16A2 Rifle, Move as a Member of a Fire Team, Control Movement of a Fire Team, Perform Movement Techniques During MOUT, and Report Information of Potential Intelligence Value. The training scenarios will be evaluated in the Land Warrior Test Bed. These evaluations will help confirm the value of virtual environment simulations as a rehearsal tool for soldiers and small unit leaders.

Indexes of ARI Publications

Abbreviations

RN	Research Note
RP	Research Product
RR	Research Report
S	Special Report
SN	Study Note
SR	Study Report
TR	Technical Report

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List of Acronyms

AAN: Army After Next
AAR: After Action Review
ABLE: Assessment of Background and Life Experiences
AC: Active Component
AC: Affective commitment
ACAP: Army Career and Alumni Program
ACCES: Army Command and Control Evaluation System
ACF: Army College Fund
ACOL: Annualized Cost of Leaving
ACS: Army Community Service
ACTD: Advanced Concept Technology Demonstration
ACTS: Army Career Transitions Survey
ADA: Air defense artillery
ADTM: Advanced team decision making
AFIST: Abrams Full-Crew Interactive Simulation Trainer
AFQT: Armed Forces Qualification Test
AI: Artificial intelligence
ANC: Army Nurse Corps
AOE: Army of Excellence
AR: Arithmetic Reasoning
ARI: U.S. Army Research Institute for the Behavioral and Social Sciences
ARMS: Aviation Reconfigurable Manned Simulator
ARNG: Army National Guard
ARPA: Advanced Research Projects Agency
ASVAB: Armed Services Vocational Aptitude Battery
AT: Active training
ATAFS: Automated Training Analysis and Feedback System
ATCCS: Army Tactical Command and Control System
ATESC: Advanced tactical engagement simulation concepts
ATM: Aircrew training manual
AWE FD: Advanced Warfighting Experiment, Focused Dispatch
AWE: Advanced Warfighting Experiment
BBS: Brigade/Battalion Battle Simulation
BBSE: Brigade and Battalion Staff Exercise
BCBL: Battle Command Battle Lab
BCDC: Battle Commanders' Development Course
BCT: Basic combat training
BDE-BSTS: Brigade Battle Staff Training System
BF: Battlefield function
BFV: Bradley Fighting Vehicle
BL: Bright light
BN-BSTS: Battalion Battle Staff Training System
BOS: Battlefield operating system

BSE: Battle staff effectiveness
BSE: Brigade staff exercise
BSTS: Battle Staff Training System
C/ST: Commander/staff trainer
C2: Command and control
C4I: Command, control, communications, computer, and intelligence
CAF: Control and feedback
CARE: Connecting Analogies with Rules and Explanations
CAS: Close air support
CAS3: Combined Arms and Services Staff School
CAST: Computerized Adaptive Screening Test
CAT: Computerized adaptive testing
CATT: Combined Arms Tactical Training
CBI: Computer-based instruction
CBT: Computer-based training
CC: Continuance commitment
CCF: Critical Combat Function
CCTT: Close Combat Tactical Trainer
CCTT-D: Close Combat Tactical Trainer – Digital
CDM: Critical Decision Method
CEP: Combat experimentation program
CEV: Combat effectiveness variables
CGSC: Command and General Staff College
CGSOC: Command and General Staff Officer Course
CID: Critical information discernment
CITT: Commander's Integrated Training Tool
CLG: Combat Leaders' Guide
CLS: Contracted logistics support
COBRAS: Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation
COFT: Conduct-of-Fire Trainer
COMPRS: Contract for Manpower and Personnel Research and Studies
CONUS: Continental U.S.
CQC: Close quarter combat
CRF: Consortium Research Fellow
CRIOT: Cognitive Requirements for Information Operations Training
CS: Combat Support
CSS: Combat Service Support
CTC: Combat Training Center
CTS: Command Team Seminar
CV*IV: Cross-validation and internal validity
CVCC: Combat vehicle command and control
DARPA: Defense Advanced Research Projects Agency
DAT: Differential Assignment Theory
DC-POI: Data collectors' program of instruction
DEA: Data envelopment analysis

DIITS: Distributed Interactive Intelligent Tutoring Simulation
DIS: Distributed interactive simulation
DL: Dim light
DoD: Department of Defense
DRS/DRE: Division restructuring/study/evaluation
DSB: Defense Science Board
DSM: Decision support methodology
DSR: Discrete speech recognition
DTIC: Defense Technical Information Center
DWN ERT: Dismounted Warrior Network enhanced restricted terrain
ECAT: Enhanced computer administered testing
ED: Emergency department
EMMii: Environment for multi-media interactive instruction
EMS: Electronic meeting system
EPAS: Enlisted Personnel Allocation System
EPRDB: Enlisted Panel Research Data Base
ESP: Eye station points
EST: Engagement Skills Trainer
ET: Embedded training
ETTCTM: Emergency Team Coordination Course [check] RN 96-09
EXUnit: Experimental unit
FA: Function analysis
FAARRS-SHARE: Forecasting and Allocation of Army Recruiting Resources Study – Sequential Hierarchical Allocation of Resource Elements
FAST: Flight Aptitude Selection Test
FEMA: Federal Emergency Management Agency
FIST-B: Full Crew Interactive Simulation Trainer – Bradley
FORSCOM: Forces Command
FOV: Field of view
FOVB: Geometric field of view
FXXITP: Force XXI Training Program
FY: Fiscal year
GAMS: General Algebraic Modeling System
GIL: Graphical Instruction in LISP
GUARDFIST I: Guard Unit Armory Device Full-Crew Interactive Simulation Trainer, Armor
HCA: Hierarchical cluster analysis
HCI: Human-computer interaction
HITT: High transfer training
HMD: Head-mounted display
HTLD: High technology light division
ICS: Individual combat simulations
ICSS: Individual combatant simulation system
IDA: Institute for Defense Analyses
IDF: Israel Defense Forces
IDT: Interactive duty training

IERW: Initial entry rotary wing
ILC: Infantry Leaders Course
IPB: Intelligence preparation of the battlefield
IRR: Individual Ready Reserve
IS: Information system
ITQ: Immersive Tendencies Questionnaire
ITTBBST-BSTS: Innovative Tools for Brigade and Below Staff Training – Battle Staff Training System
J/DM: Judgment and decision making
JAC: Job Assistance Center
JMDT2: Joint and Multi-Service Distributed Training Testbed
JRISS PMO: Joint Recruiting Information Support Systems Program Management Office
JRTC: Joint Readiness Training Center
KE: Knowledge elicitation
KR: Knowledge of results
KWCT: Kiowa Warrior Crew Trainer
LMTS: Laser Marksmanship Training System
LROC: Longitudinal Research on Officer Careers
M&S: Mobility and survivability
MBBL: Manned Battlespace Battle Lab
M-COFT: Mobile Conduct-of-Fire Trainer
MDMP: Military decision making process
MDT2: Multi-Service Distributed Training Testbed
MEPS: Military Entrance Processing Station
METT-T: Mission, enemy, terrain, troops, and time
MFO: Multinational Force and Observers
MGIB: Montgomery G.I. Bill
MILES: Multiple Integrated Laser Engagement System
MILT: Military Language Tutor
ModSAF: Modular Semi-Automated Forces
MOS: Military Occupational Specialty
MOUT: Military operations in urban terrain
MPP: Mean predicted performance
MPR: Manpower and personnel research
MTF: Monitoring the Future
NCO: Noncommissioned officer
NCTM: National Council of Teachers of Mathematics
NDM: Naturalistic decision making
NEO: Trait neuroticism
NFA: National Fire Academy
NGB: National Guard Bureau
NLP: Natural language processor
NSAID: Non-steroidal anti-inflammatory drug
NTC: National Training Center
NVG: Night vision goggle

O/C: Observer/controller
OADB: Officer Administrative Data Base
OCONUS: Outside continental U.S.
ODA: Operational Detachment Alpha
OJE: Operation Joint Endeavor
OLRDB: Officer Longitudinal Research Data Base
OMF: Officer Master File
OPFOR: Opposing force
OPICC: Officer Personnel Inventory, Cost and Compensation
OSETDB: Officer Standardized Educational Testing Data Base
PBL: Problem-based learning
PCC: PreCommand Course
PC-EPAS: PC-Based Enlisted Personnel Allocation System
PERSTEMPO: Personnel tempo
PIR: Parachute infantry regiment
PK: Peacekeeping
POI: Program of instruction
PQ: Presence Questionnaire
PTSD: Post-traumatic stress disorder
R&D: Research and development
R&S: Reconnaissance and surveillance
RAOC: Royal Army Ordnance Corps
RC: Reserve Component
RCVTP: Reserve Component Virtual Training Program
REM: Rapid eye movement
REQUEST: Recruit Quota System
RJP: Realistic job preview
RPD: Recognition-primed decision
RSTA: Reconnaissance, surveillance, and target acquisition
RWARU: Rotary Wing Aviation Research Unit
S&CEM: Selection and Classification Evaluation Model
SAF: Semi-automated forces
SAMAAR: Self assessment based mini-AAR
SAT: Systems approach to training
SATS: Standard Army Training System
SBIR: Small Business Innovative Research
SCRF: Senior Consortium Research Fellow
SD: Standard deviation
SF: Special Forces
SFAS: Special Forces Assessment and Selection
SFQC: Special Forces Qualification Course
SGT: Staff Group Trainer
SIMBART: Simulation-Based Mounted Brigade Training
SIMITAR: Simulation in Training for Advanced Readiness
SIMNET: Simulation networking
SIMUTA: Simulation-Based Multiechelon Training for Armor Units

SIMUTA-B: Simulation-Based Multiechelon Training for Armor Units – Battalion Exercise Expansion
SIMUTA-D: Simulation-Based Multiechelon Training for Armor Units – Digital
SJT: Situational Judgment Test
SME: Subject matter expert
SMF: Separation Officer Master File
SOC: Survey on Officer Careers
SOF: Special Operations Forces
SOP: Standard operating procedures
SOPO: Special Operations Proponency Office
SPSS: Statistical Package for the Social Sciences
SQT: Skill Qualification Test
SROE: Soldier rules of engagement
SSQ: Simulator Sickness Questionnaire
STAARS: Standardized Army AAR System
STAMP: Survey of Total Army Military Personnel
STOW: Synthetic Theater of War
STRATA: Simulator Training Research Advanced Testbed for Aviation
STRICOM: U.S. Army Stimulation, Training, and Instrumentation Command
STRUCCTT: Structured Training for Units in the Close Combat Tactical Trainer
STTR: Small Business Technology Transfer
T&EO: Training and evaluation outline
TADSS: Training aids, devices, simulators, and simulations
TAF: Training analysis facility
TAPLIM: Total Army Personnel Life Cycle Model
TARDEC: Tank Automotive Research, Development, and Engineering Center
TCC: Tactics Certification Course
TCDC: Tactical Commanders' Development Course
TDA: Table of Distribution and Allowances
TDY: Temporary duty
TES: Tactical engagement simulation
TF: Task force
THP: Take home package
TOC: Tactical operations center
TOT: Transfer of training
TQM: Total Quality Management
TRADOC: U.S. Army Training and Doctrine Command
TRICAP: Triple capabilities
TSOP: Training Strategies Optimization Prototype
TSP: Training support package
TTP: Tactics, techniques, and procedures
TTVIII: Tank Table VIII
UCOFT: Unit Conduct of Fire Trainer
UPAS: Unit Performance Assessment System
USAAVNC: U.S. Army Aviation Center
USAJFKSWCS: U.S. Army John F. Kennedy Special Warfare Center and School

USANGB: U.S. Army National Guard Bureau
USASC: U.S. Army Safety Center
VE: Virtual environments
VEPAB: Virtual Environment Performance Assessment Battery
VIC: Virtual Individual Combatant
VIDS: Vehicle Integrated Defense System
VIEW: Visualization and interactive workstation
VSI/SSB: Voluntary Separation Incentive/Special Separation Benefit
VTP: Virtual Training Program
WK: Word Knowledge

REPORT DOCUMENTATION PAGE

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A bibliography of ARI technical publications from FY95 through FY99, including abstracts, Author and Subject Indexes and a list of acronyms.

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